DOCUMENT RESUME

ED 053 755	LI 002 989
AUTHOR	Minker, Jack
TITLE	Generalized Data Management Systems--Some Perspectives.
INSTITUTION	Maryland Univ., College Park. Computer Science Center.
SPONS AGENCY	Auerbach Corp., Philadelphia, Pa.; National Bureau of Standards (DOC), Washington, D.C.
REPORT NO	TR-69-101
PUB DATE	Dec 69
NOTE	125p.; (45 References)
EDRS PRICE	EDRS Price MF-$0.65 HC-$6.58
DESCRIPTORS	*Computer Programs, *Computer Science, *Electronic Data Processing, *Information Systems, *Management Information Systems
IDENTIFIERS	Computer Software

ABSTRACT

A Generalized Data Management System (GDMS) is a software environment provided as a tool for analysts, administrators, and programmers who are responsible for the maintenance, query and analysis of a data base to permit the manipulation of newly defined files and data with the existing programs and system. Because the GDMS technology is believed to be important for Management Information Systems (MIS), section 2 of this paper discusses the overall problems attendant with MIS. Section 3 describes some of the components of a GDMS and the role of a GDMS within a MIS. An example which shows how generality is achieved in a GDMS to permit the same file maintenance and retrieval programs to operate on many different files is discussed. Section 4 provides some historical perspective on some of the early developments within this technology. Four types of GDMSs are recognized and described briefly. Trends and developmental needs of GDMSs are noted in Section 5. Over 60 GDMS systems are listed in a summary chart in Appendix I. Appendix II contains a Key Word In Context Index (KWIC) to the literature of this field. (Author/NH)

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Technical Report 69-101 December 1969 (5)

GENERALIZED DATA MANAGEMENT SYSTEMS - SOME PERSPECTIVES (2)

by

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This paper was supported by the National Bureau of Standards under contract number CST-821-5-69. The work was also supported in part by the AUERBACH Corp~~oration~~., Philadelphia, Pa.

A portion of this paper was presented as an invited talk at the Tenth American Meeting of the Institute of Management Science, Atlanta, Georgia, October 1-3, 1969. The title of the talk as listed in The Bulletin of TIMS, August, 1969, Vol. 15, No. 5-6, is "Generalized Data Management Systems - A Tutorial".

The author would like to express his appreciation to Mrs. Elizabeth Fong of the National Bureau of Standards and Mr. Daniel Fishman of the University of Maryland who helped to compile the bibliography and to obtain the Key Word in Context Index that appears as a part of this paper.

LI 002 989

ABSTRACT

Generalized data management systems have been evolving since approximately 1958. The technology is an outgrowth of work conducted originally on military applications concerned with manipulating large data bases. A generalized data management system is a software environment provided as a tool for analysts, administrators, and programmers who are responsible for the maintenance, query and analysis of a data base to permit the manipulation of newly defined files and data with the existing programs and system.

Because of their applicability to a wide class of problems within industry and government, generalized data management systems will gain wide-spread use over the next several years. The class of problems addressed by such systems are those in which the problem data in terms of format, number of files, and data structures will not remain stationary over the period of implementation, and there is danger of early obsolescence of the system if it cannot handle data changes for any one application.

In this paper, some of the developments that have taken place in this technology are reviewed, some characteristics of generalized data management systems are noted, the trends that are likely to develop are explored, and their applicability for management information systems is described.

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1. Introduction

The technology of Generalized Data Management Systems (GDMS) has, during the past year, gained considerable attention. Furthermore, many individuals believe that the technology is important for Management Information Systems (MIS). It is because of this relation between MIS and GDMS that section 2 of this paper discusses the overall problems attendant with MIS. Section 3 then describes some of the components of a GDMS and the role of a GDMS within a MIS. A simple example is discussed in section 3 that shows how generality is achieved in a GDMS to permit the same file maintenance and retrieval programs to operate on many different files.

Developments in GDMS have taken place since approximately 1958. In section 4 some historical perspective is provided on some of the early developments within this technology. The relation between early developments and the current technology is traced in several instances. Four types of GDMSs are recognized and described, briefly. Trends and developmental needs of GDMSs are noted in section 5.

GDMSs that are known to the writer have been listed in a summary chart in Appendix I. Over 60 systems are noted in the chart. Appendix II contains a Key Word In Context Index (KWIC) to the literature of this field.

2. Management Information System Problems

Over the past several years there has been a great deal of discussion concerning the subject of Management Information Systems. Except for the desire to provide the management of a corporation with timely and pertinent information, there appears to be no universally accepted definition of a MIS. Some organizations consider a MIS to be one in which a computer prints a list of charges made by individuals to specific projects. Other organizations who have a Personnel File on punched cards and can manipulate the cards with a card sorter consider that they have a MIS. Certainly for portions of an organization both examples are suitable MISs. However, if one is concerned with the top management of a corporation, the two items by themselves would be inadequate. What is required for top management is a system that makes available to them information concerning all of the resources of the corporation. By this is meant information concerning such factors as personnel, equipment, finances, customers, or status of projects to mention but a few items. The top management of a corporation must make decisions concerning the business activities of the corporation. Many of the decisions cannot be based merely on retrieved data, but must be based on analyses derived by using the data as, for example, finding the average cost of producing a specific item.

Within a small corporate organization perhaps the best manager is the individual who runs the operation without a MIS. He knows his few workers, his customers, and his technology. A reliable secretary who has a good filing scheme is generally all that is required. Within somewhat larger corporate organizations, the pertinent information typically resides with a few individuals. These individuals can be contacted readily when required. Such an organization introduces a level of remoteness between management and workers in the organization. Responses to questions about separate aspects of the business depend upon the availability of personnel. If an individual is ill or on a trip, obtaining facts rapidly is, at times, a problem. However, the organization can still operate effectively. Mechanized aids become particularly useful, and indeed a necessity for large organizations where there are several layers of management, and a diversity of corporate activities.

The use of a computer to develop a Management Information System is appealing. One can store a great deal of information in a computer, its operations are fast, data can be retrieved rapidly and computations can be formed handily. The natural thought is to have terminals available to management so that they may access the information they desire on an on-line basis. If it is true that computers are so powerful, one might ask why there are so few computerized MIS systems in operation. Indeed, one would be hard pressed to describe a single large corporation that has a mechanized MIS for the entire corporation. The author would be anxious to learn of one computer manufacturer, or one software house who can claim to have such a system. And yet these organizations discuss Management Information Systems with such eloquence that one would believe that such systems could be developed readily if only they were provided adequate funds.

Several reasons why there are so few total corporate Management Information Systems that have been mechanized are listed below:

(1) High Conversion Cost - The conversion of all information that pertains to a corporation's operations to machine readable form is costly.

(2) Diverse Information Needs - The information needs of management may vary drastically depending upon the type of corporation, its organization, and its personnel characteristics. To determine the information needs of a corporate structure requires a comprehensive study of the corporation. Such studies are both expensive and time consuming if

they are to consider all corporate operations. The range of information needs within a corporation may vary from a requirement to determine how much inventory is at hand to developing the average levels of sales during a particular period. Responses to management information needs must be timely to be of use.

(3) Dynamic Nature of Business - The nature of the business in which a corporation is involved can change radically within short periods of time. New products may be introduced, old products dropped, and entirely new ventures started.

(4) Changing Organizational Structure - The organization that does not have a complete management reorganization at least once every six months is rare.

(5) Diverse Analysis Needs - Data in itself is not significant. Rather, it is the analysis performed upon the data and the use to which it is put that is significant. The manipulations required once data is retrieved can be complex. Each corporation has a need for different kinds of analyses. A study of the data analysis needs of a corporation is required before a MIS can be developed. A MIS for an oil industry may require a linear programming algorithm to determine the optimium shipping strategy for a product. Other corporations may require other types of analyses.

Were cost and time the only problems, numerous MISs would be in existance. The problem in developing a comprehensive MIS lies basically with the last four items noted above. The dynamic nature of a corporation implies that information about new products must be input to the machine, and new relationships between data that already exist in the system be recognized. As new data is entered into a mechanized system, management requires new analyses to be made on the data, and new formats for exhibiting the results must be devised. The changing organizational structure within a corporation implies that files must be reorganized completely, and sometimes new entries added to files not previously anticipated. The diverse information needs imply a multiplicity of data with a multiplicity of different data organizations.

The major technological problem, in designing a comprehensive MIS is, therefore, that the class of problems characterized by a MIS is one in which the problem data in terms of format, number of files and data structures do not remain stationary over the period of implementation, or beyond this period. To have a separate program to manipulate each data organization results in a prohibitive cost. Furthermore, if management must wait for programmers to revise and write new programs continually, on-line use of a system becomes a slogan, not a reality. In this case, the system development lags behind the needs of management and hence is of limited use at best.

3. Components of Generalized Data Management Systems

The technological problem described above is not a new phenomenon. Generalized Data Management Systems have and are being developed to cope with many of the problems outlined above. Developments that have their roots in work that started in approximately 1958 give considerable promise for lessening the problems described, and for making Management Information Systems useful for large corporations in the not too distant future.

The technology termed Generalized Data Management Systems is an outgrowth of efforts expended on military problems to be able to store, maintain, retrieve, manipulate and present output data of formatted information stored in massive files and records in digital computers. Corporate requirements for the management of information is no more complicated than the problems that have perplexed the military.

Minker and Sable (GEN-MINK67)(1) have noted that, "a data management system is a software environment that the data center provides as a tool to a staff of analysts, administrators, and programmers who are responsible for maintenance, query and analysis of a data base. A data management system is considered generalized when it permits the manipulation of newly defined files and data with the existing programs and systems."

More specifically stated, a generalized data management system is any set of software which

(1) is not tied to a particular set of programs or files

(2) facilitates reference to data by name and not by physical location

(3) facilitates operations on data such as
    (a) data definition
    (b) data storage
    (c) data maintenance
    (d) data retrieval

(4) facilitates the expression of logical relationships among data items.

There are a number of generalized data management systems in existance and currently under development. These systems vary considerably with respect to their features. Sable, et al. (GEN-SABL65) surveyed several relevant data management systems and specified a number of characteristics that should be contrasted when viewing such systems. More recently, the Committee on Data Systems Languages of the Association for Computing Machinery, the CODASYL Committee (GEN-CODA69) has developed an extensive list of characteristics of generalized data management systems, and has analyzed nine recent systems according to the characteristics specified. Several other descriptions of features of generalized data management systems have been developed. Notable among these are the report by Fry et al. (GEN-FRYB68) (which apparently was used as the starting point for the CODASYL Committee report), by Dowkont, et. al. (GEN-DOWK67), by Sable and Cochran (GEN-SABL68); and two earlier surveys by Sable and Minker (GEN-SABL66) and by Massachusetts Computer Associates (GEN-AFSC64).

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(1) The code within the bracket refers to the Key Word In Context (KWIC) index given in Appendix II. The second section of the KWIC index contains the bibliographic citation. The second section of the KWIC index is sorted by the code.

Several aspects of a generalized data management system are: the user languages, the data structures and file organizations, the data access methods, the output presentation capability, the system processing capabilities, and the programmer interface. There are, within each of the categories, numerous additional capabilities that may be noted. See, for example, the CODASYL Committee report for additional features. Over sixty developments in Generalized Data Management Systems are tabulated in Appendix I. A comprehensive bibliography and Key Word In Context Index is provided in Appendix II.

It would be well to describe, briefly, why the technology of Generalized Data Management Systems arose. Except for the development of generalized sort/merge routines and report generators that could format data to be output from the computer, few general techniques were prevalent in the 1950's to permit different files of data to be manipulated by generalized routines.

The need for general routines was pressing since military users required rapid response to questions posed concerning data in files. Unfortunately, prevalent techniques were primitive. For each file a new program had to be written; and when new types of information, not specified previously by the user, were introduced, the file designers and implementors had to revise their programs extensively. Each time a new question was asked of the file of data, new programs had to be developed. Programmers responsible for the design and implementation of such systems became concerned, because they believed they could have solved a more general problem had the user provided sufficient information in the problem definition stage. On the other hand, users were concerned since their requirements changed and, if a computer had to be reprogrammed and debugged for slight changes to their problems, what use would computers be for the applications that they had to deal with in real life?

Some programmers looked upon the user needs as a design challenge. Namely, that of developing techniques of a generalized nature to permit new files to be entered into the data base and changes to be made in format and in the type of data to be retained within an existing file without requiring a corresponding change in the program. These developments represent the beginning of the new technology of GDMS.

Four aspects of a GDMS are described in the following four sections. The description should permit the reader to comprehend how the programmer is able to develop a generalized program.

3.1 Data Structures and Data Description

The main characteristic that distinguishes a generalized data management system from one that is not generalized is the ability to describe data structures that link data entries to one another, and to contain programs that manipulate the described data. To describe what is meant by this statement, it is useful to consider sample files. The structure of the Personnel File shown in Figure 1 is simple and straightforward. There are only five facts that describe an individual. These are the name of the individual, his year of birth, sex, height and job classification. A second file that might be contained within the same corporation is a Reliability File, Figure 2. As in the Personnel File, there are exactly five facts of interest. These facts are quite similar to those in the first file. For example, one deals with the name of a component while the other deals with the name of the individual - both are alphanumeric quantities. While one is concerned with the height of an individual, a numeric quantity, the other is concerned with the mean time to failure - also a numeric quantity. By analyzing both files, it is clear that there is a parallel between file entries. It is also clear that the structure drawn in Figure 3 applies equally to both files where no names of fields are attached to the nodes of the tree. The top of the tree denotes a file, the next level denotes the fact that there may be many records and the third level denotes the fact that there are five fields in each record.

Since the two structures are identical, if one program is written to operate upon the data structure as evidenced by Figure 3, exclusive of the names attached to the nodes of the structure, a generalized approach results for handling many different files by the same program. Designers have been able to develop generalized programs to operate upon such data structures and, indeed, upon much more complex structures. To permit a particular file to be handled, the user must describe the entries

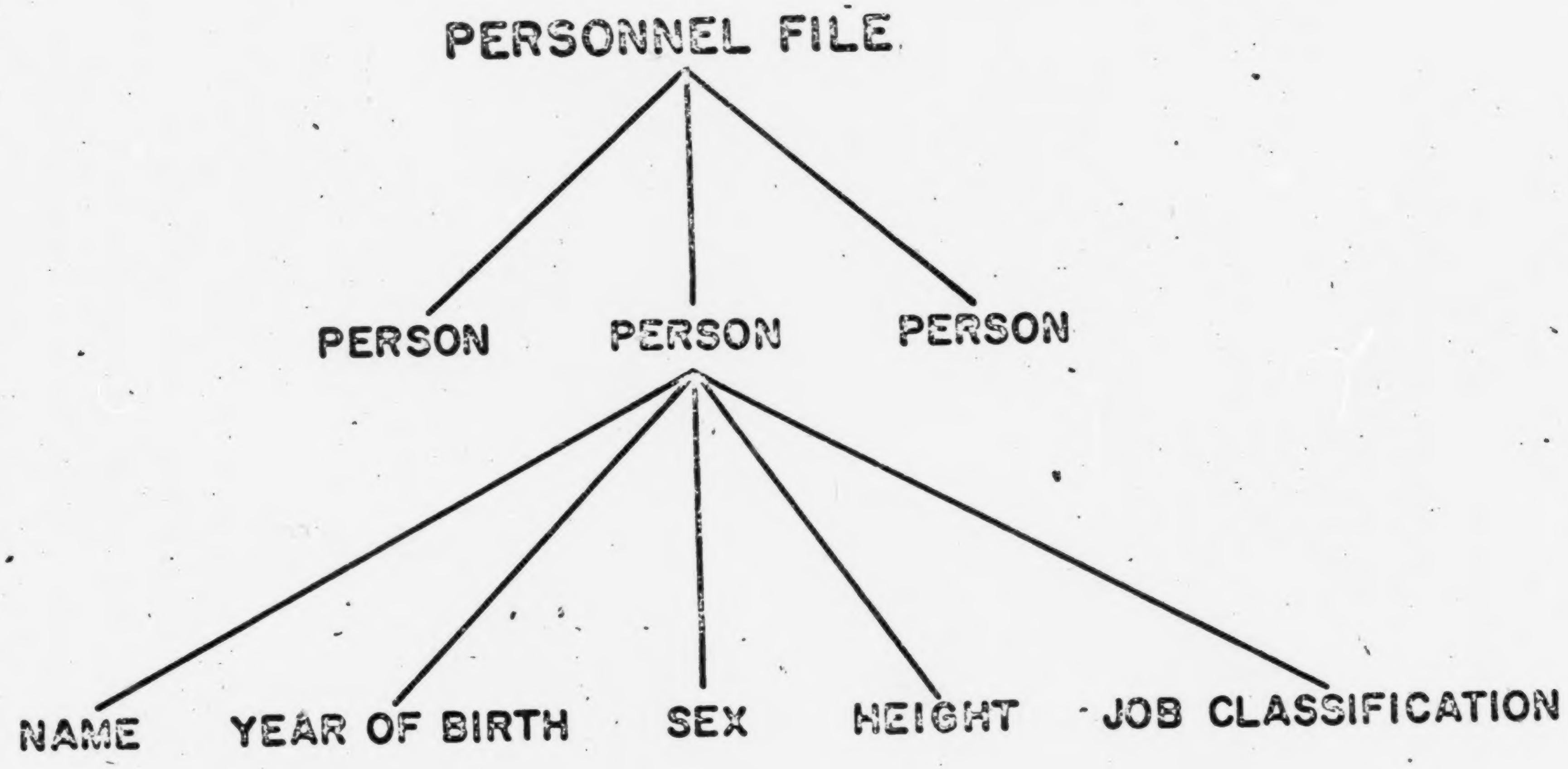
PERSONNEL FILE
PERSON
PERSON
PERSON
NAME
YEAR OF BIRTH
SEX
HEIGHT
JOB CLASSIFICATION

FIG. 1 PERSONNEL FILE

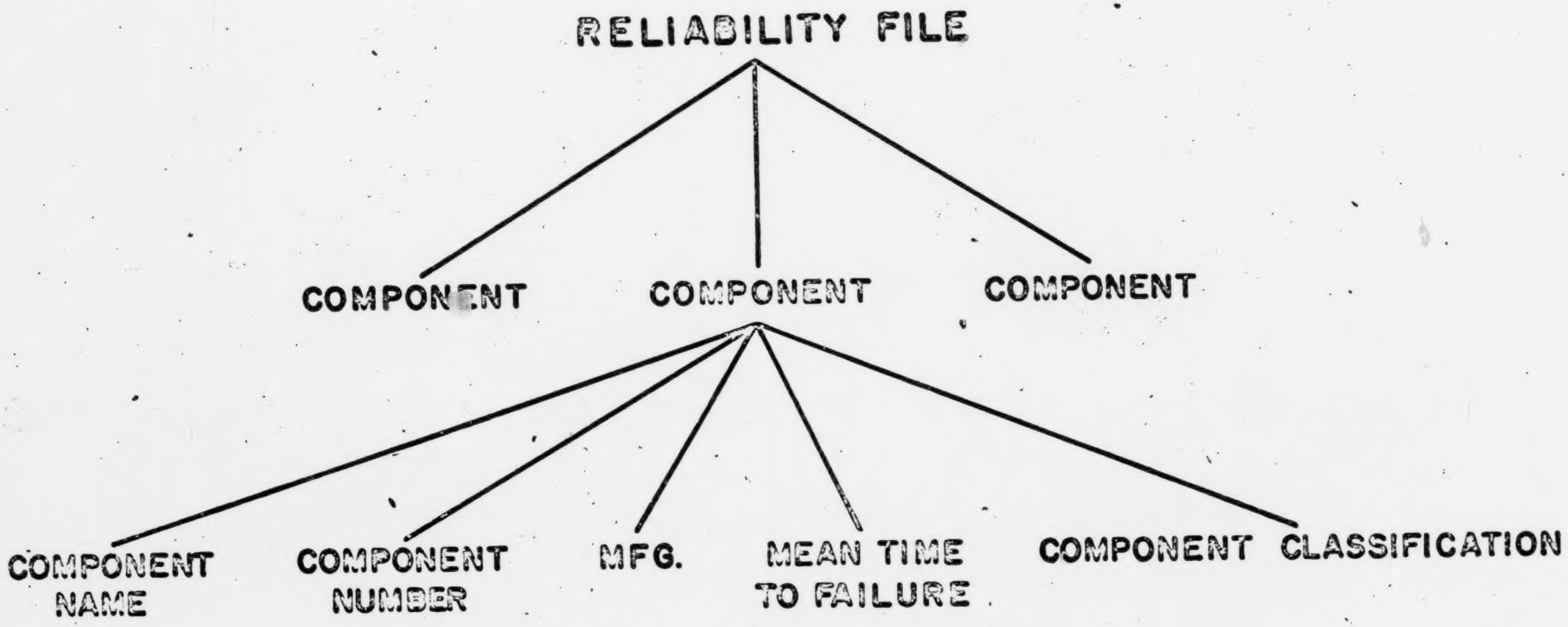
RELIABILITY FILE
COMPONENT
COMPONENT
COMPONENT
COMPONENT NAME
COMPONENT NUMBER
MFG.
MEAN TIME TO FAILURE
COMPONENT CLASSIFICATION

FIG. 2 RELIABILITY FILE

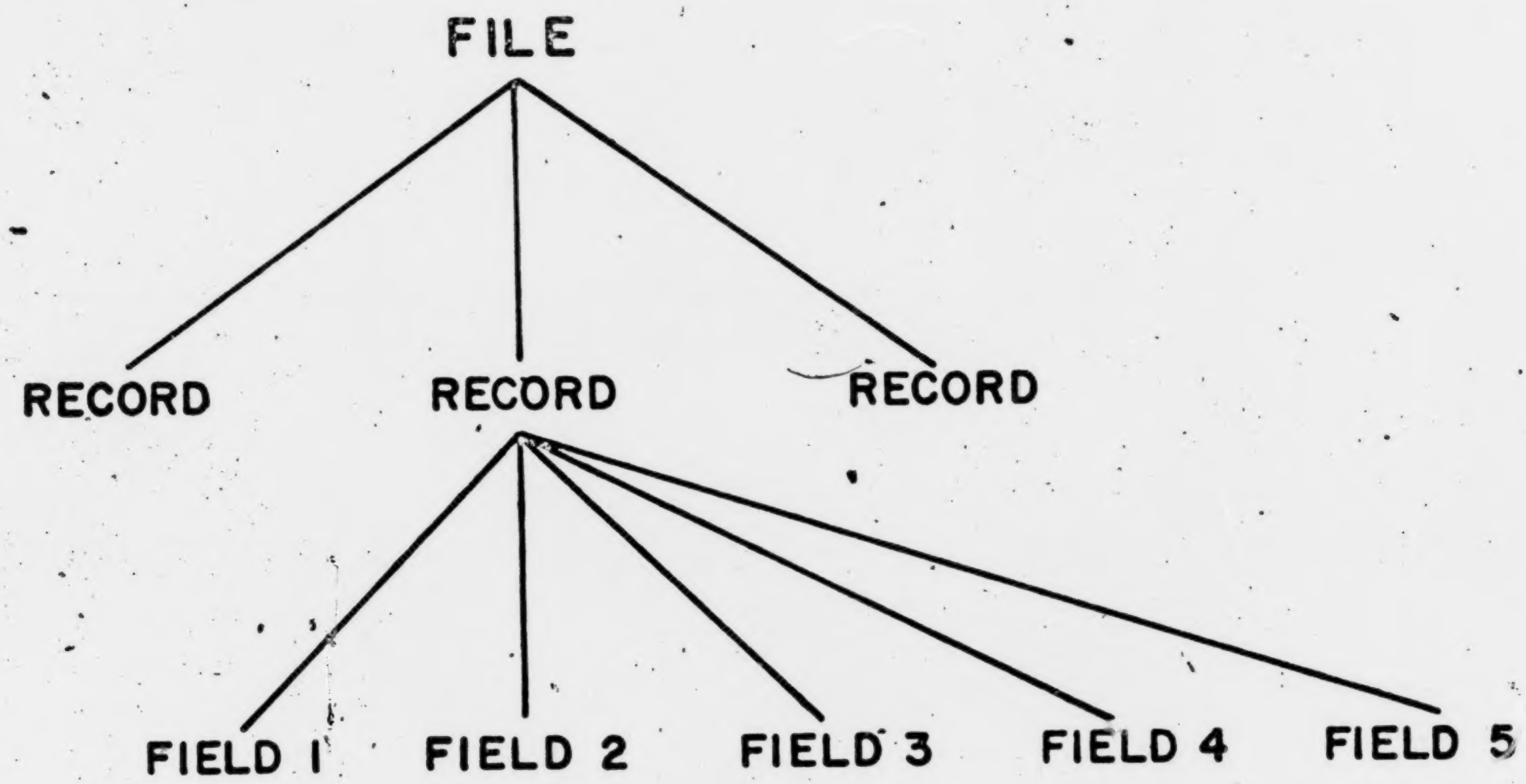
FILE
RECORD
RECORD
RECORD
FIELD 1
FIELD 2
FIELD 3
FIELD 4
FIELD 5

FIG. 3 TREE FILE STRUCTURE

of his file to the system. The ability to describe data to a system is extremely important. For, this capability, together with the ability of a program to operate upon the described data, provides the ingredient of a generalized system. The capability to describe data to a GDMS is provided by a data description language.

We shall illustrate what is meant by operating on described data by considering the simplified table shown in Figure 4. A generalized program can be designed to operate upon this table to get at entries in a data record. For example, a query program, when it finds that the sex of an individual is needed, determines, by searching down the column entitled, FIELD NAME in the data description record, the word SEX. The entry corresponding to START of FIELD LOCATION, specifies that in the twenty-second word of a record, information is given concerning the individual's sex. Knowing the starting location of the first word of a record easily gives the 22nd word. Thus, by analyzing the data description, the precise location of the data in the record can be determined. The data description provides an indirect reference to the entries in a file.

Data structures that are more complex than the above elementary structures are required for MISs. Data records to be contained within records indefinitely are of extreme importance. An example of such a structure is shown in Figure 5. For typical corporations, the data structures must be able to exhibit that one individual may report to several individuals, and may also have several skill specialties. Any corporation interested in a particular generalized data management system must investigate, first, whether or not the data structures permitted are sufficiently rich to facilitate its use by the corporation.

FIELD NUMBER	FIELD NAME	TYPE FIELD	SIZE FIELD	START OF FIELD LOC.	FIELD UNITS
1	NAME	A	20	+1	—
2	YEAR OF BIRTH	N	1	+21	YEAR
3	SEX	A	1	+22	—
4	HEIGHT	N	1	+23	INCHES
5	CLASSIFICATION	AN	10	+24	—

FIG. 4 PERSONNEL RECORD DATA DESCRIPTION

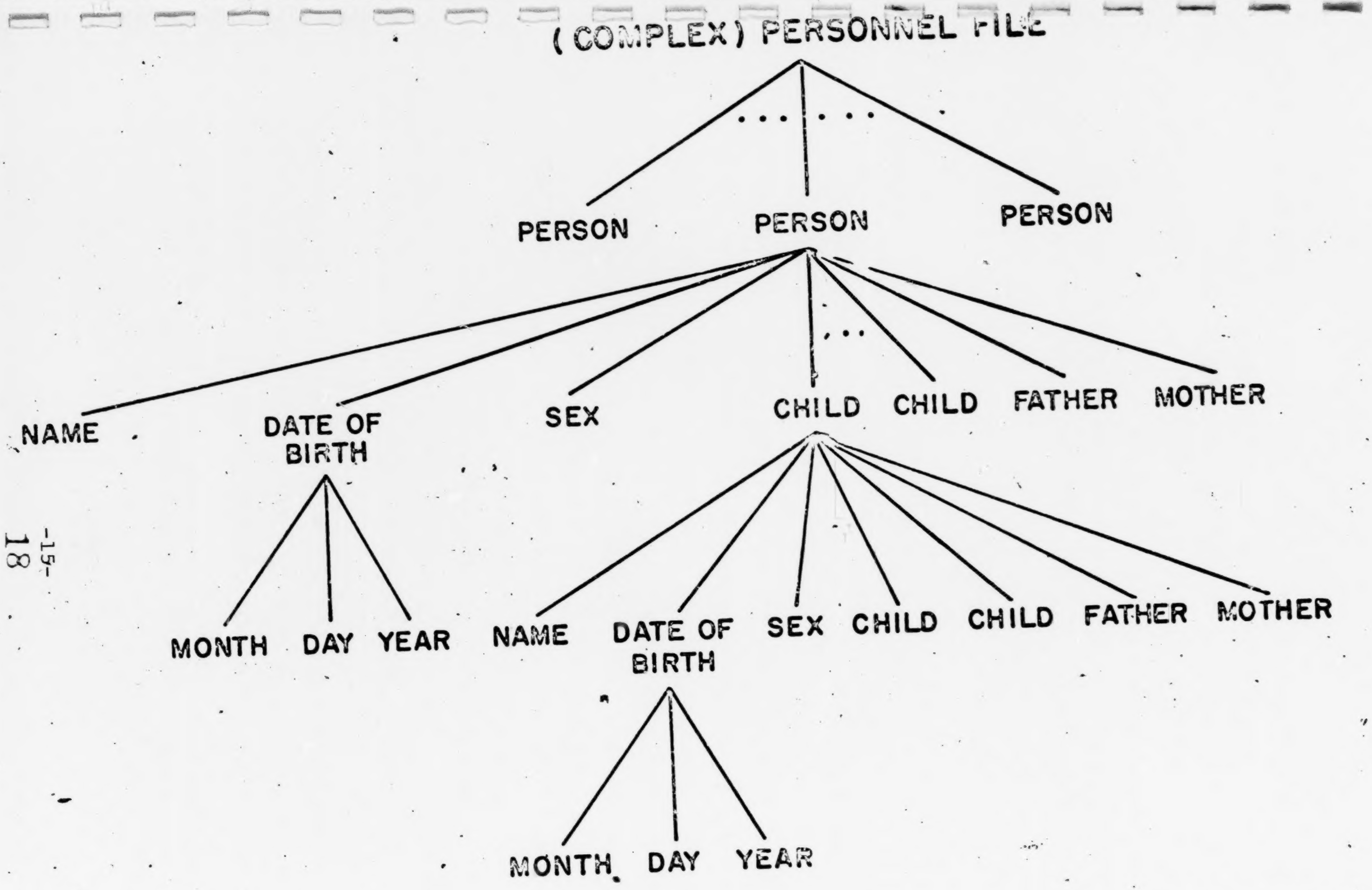
(COMPLEX) PERSONNEL FILE
PERSON
PERSON
PERSON
NAME
DATE OF BIRTH
SEX
CHILD
CHILD
FATHER
MOTHER
MONTH
DAY
YEAR
NAME
DATE OF BIRTH
SEX
CHILD
CHILD
FATHER
MOTHER
MONTH
DAY
YEAR

FIG. [illegible] COMPLEX DATA STRUCTURE

Systems that are currently under development, or have recently been made available, such as Data Manager-1 (DM-1)(1) by the Auerbach Corp. (DM-1-DIXO67), Time-Shared Data Management System (TDMS) by the Systems Development Corp. (TDMS-BLEI67), and Generalized Information System (GIS) by IBM (GIS-BRYA66) are designed to manipulate data structures that are at least as complicated as that expressed in Figure 5. The complexity of the data structures that may be manipulated vary considerably among generalized data management systems.

3.2 Query Language

Several features of a generalized data management system were noted in section 3. As far as the user, and indeed, management is concerned, perhaps the most important feature is the ability to query the system using a form of English statement. Most generalized data management systems in today's technology have such a capability. As a minimum, the language specified, usually termed a query language, provides the user with the ability to specify the selection criterion to be satisfied by the retrieved records, and the format of the information to be extracted from these records. The use of a restricted form of English rather than natural language is due to the fact that natural language is much too syntactically complex and semantically ambiguous to be efficient for man-machine communication.

On the other hand, the syntax of a query language permits queries to a data base in such a manner that the query statement is syntactically and semantically unambiguous. The query language may be flexible enough to handle arbitrary logical conditions usually specified with Boolean operators, AND, OR and NOT. It is important that a general facility exist to handle any question since it is not possible for a user to anticipate all questions that he could conceivably ask of the data base. Thus, in a GDMS the system designer has planned for having any logical question answered, and, when management wants a response from the file, he merely expresses the question using the specified query language, and receives a response from the system without having a new program written.

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(1) Appendix I contains a table that lists acronyms for the names of systems, and the corresponding name of the system.

A typical query language consists of several verbs, or commands to the system, punctuation marks that serve to clue the system as to what might follow, attributes describing the entity to be searched, and relationships between the attributes and the values for the attributes. Thus, a typical query might be stated as shown in Figure 6.

The query may be interpreted as follows: "From the PERSONNEL FILE, SELECT all records in which the person's NAME alphabetically succeeds SMITH, AND the individual is either between the AGE of twenty and thirty OR the HEIGHT of the individual is less than 70 inches. SORT the resulting records alphabetically according to the individual's NAME, and within name by AGE. PRINT the name, AGE, HEIGHT and SEX of each person so selected".

The main aspect of a query language is that it can be specified in such a fashion that permits the syntax of the language to be translated unambiguously by a mechanical procedure. Another important feature is that within the SELECT function (or an equivalent statement), there is a capability to specify any logical condition concerning the record.

Several systems currently under development offer query

QUERY: PERSONNEL FILE, SELECT ((NAME SMITH) AND
((20≤AGE<30) OR (HEIGHT≤70))),
SORT (NAME, AGE), PRINT (NAME, AGE,
HEIGHT, SEX);

FIG. 6 HYPOTHETICAL QUERY

languages as powerful as that outlined above. Thus, systems such as DM-1, TDMS, and GIS noted previously; INFOL, Information Oriented Language (INFO-OLLE67) operational for the CDC 3600 and 3100, MARK IV (MARK-POST68) developed by Informatics, Inc. for the IBM 360 system, and MANAGE, Moderately Advanced Data Management System (MANA-SCIE66) developed by Scientific Data Systems are other systems that offer a query language. The manner in which each system specifies its query language may vary. For example, the MARK IV system requires that a specified format be completed for each query in contrast to the relatively free format shown in Figure 6.

Another feature of importance is the ability, or lack thereof, to permit maintenance operations to be specified by a language. A maintenance language permits records to be added, entries to be changed or modified in some manner, or combinations of these operations to be performed. Indeed, the maintenance commands are similar to the query commands, and portions of the coding employed by the query are used for the maintenance operations. For example, the logical condition associated with the query can be used in the maintenance operations. Because the user typically is not involved with the maintenance of the data base, designers have paid insufficient attention to this aspect of the problem. In most applications, more time is spent maintaining the data base in contrast to querying the data base. Depending upon the design approach, speeding maintenance operations may slow the retrieval process.

There are two approaches that have been used in implementing a query language. The first approach is to compile the code, and to then run the compiled code against the file. The second approach has been to operate upon the code interpretively. Generally in interactive on-line environments, one tries to interpret the code to avoid the time required by a compilation process. In the compiled case the data description and location of data are bound to the code before any record is analyzed so as to determine whether or not it satisfies the query. If one refers to the data description table shown in Figure 4, given a name of a field, in the compiled case, the query master program analyzes the fact that there is a name of a field, goes to the data description table, looks up the name of the field in the table, finds out where the data is located in the record and substitutes into the compiled code the location of the field relative to the start of the record. Thus, it binds the location of the data in the record to the code before run time. In the interpretive approach the data description, the query and the record are scanned at the time each record is being analyzed, and the data is bound to the query during run time. Hence, the same basic operations are done by each approach.

In two different implementations of the same system, the approach of compiling was used for DM-1 on the GE-635, and for SC-1 (which uses the DM-1 design) the interpretive approach was used.

3.3 Program Linkage Capability

Within a Management Information System, application programs exist that perform analyses upon data stored in the files. The analyses are required to permit management to make decisions. The data within the generalized data management system must therefore be accessible to application programs. A generalized data management system that has the ability to link application programs and generalized data management programs would facilitate Management Information Systems. To illustrate the need, consider the case where we desire to ask one query to locate all manufacturer factories that contain a specified product; and another query of a different file to locate all customers needing the product. We then would like to apply a linear programming algorithm to minimize the cost in transporting the goods from the factories to the customers. Indeed, it is just this capability of linking application oriented programs to the data base that is particularly needed for Management Information Systems.

A major portion of a MIS is the ability to specify operations upon the output of queries, as for example, statistical operations. As noted previously, data in itself is not significant, but the synthesis and the analysis of the data is of fundamental importance to all levels of management. Analyses of data may be required that were not anticipated previously. When required, management should be able to receive responses rapidly. If an application program is to be written, it should be able to be linked in with the data management code.

Unfortunately, it is in this feature so important for a MIS that GDMSs are particularly deficient. The DM-1 system is designed to permit such flexibility. The system has been implemented and is in experimental use at this time. The experimental results have not yet been published so that one cannot tell how well it will operate. The Time Shared Data Management System has some capabilities in this direction. However, TDMS is a self-contained system and one cannot readily enter new code and tie-into TDMS. Subsequent improvements in TDMS undoubtedly will consider this aspect.

3.4 Mapping of Data Structures in a Computer

Logical data structures refer to the relationships that exist among the data elements. On the other hand, the way in which one physically stores the structures within the computer determines the response time of the system. Some systems store all data on tapes. For example, Information Processing System (IPS) (IPS-USNA63), designed for the Navy by IBM is a serial search type system. MARK IV, although capable of being stored on disc or drum, is by and large a serially operated system. Improvements are being made in the system to permit it to take advantage of the random access capability of the system. In serially stored data management systems, the fastest response time to a query is the time that it takes to pass the entire file and to compare all records in the file against the query. This usually takes the length of time to pass the tape since core processing is usually faster than tape movement. To gain speed, queries are generally batched. Since core processing is faster than tape transfer, several queries can look at one record before the next record is entered. Thus, in one sweep of a file, it is possible to answer several queries in the same time that it would take to answer one query.

To achieve speed and avoid looking at every record requires that the data be indexed and stored on a medium that can be accessed randomly, for example, on disc. Some current systems that permit indexing are GIS and DM-1. TDMS by its very nature is completely indexed. Unless appropriate indexing is performed, a system that uses disc does not necessarily enhance system retrieval. The Formatted File System (FFS) (FFS-DEFF66) designed by IBM for the Defense Intelligence Agency; and the 473L system (473L-BARL64) also designed by IBM are all basically tape oriented systems in which the data has been stored on disc. That is, records are accessed sequentially and do not take advantage of the random access capability of the device on which the data is stored.

An indexed system requires a great deal of maintenance. Each time data is moved or entries added, not only the record, but the total index structure must be revised. Indirectly referencing a record as noted by Minker and Sable (GEN-MINK67) through the name of the record, rather than its physical storage location saves many operations in the maintenance process. However, it causes another access to data and thereby serves to slow the response to queries.

4. Historical Perspectives in Data Management Developments

It might be well to review some of the developments that have taken place in Data Management technology. Work started in the late 1950's and was sponsored primarily by the military. At the David Taylor Model Basin (now the Naval Ship Research and Development Center) a data management system called Tape Updater for Formatted Files - Format Table Tape Updater and Generator (TUFF-TUG), (TUFF-WILK63) was develo[illegible] in conjunction with IBM. Originally conceived as a generalize[illegible] query capability for the IBM 704, TUFF-TUG evolved into an integrated 704/7090 system with the ability to generate, update and query formatted files compatible with the system. The three phases of the system are Information Retrieval, TUFF, and TUG. Work on TUFF and TUG apparently began in the summer of 1959.

The Information Retrieval phase of TUFF-TUG was under the direction of Dr. Ruth Davis. Others who were concerned with the investigation of generalized techniques for the diverse files concerning intelligence, logistics, operations and numerous others were Dr. Alison Todd and Nancy R. Vesper.

As an outgrowth of TUFF-TUG, the Information Processing System (IPS) (IPS-IBMF62), was then developed for the CDC 1604 to be used by the Atlantic and Pacific Operation Control Centers. The development of IPS started in 1962 and it was operational in 1964. IPS permitted hierarchical levels of data in the structure. A useful function within IPS was the ability to write a program, have it compiled into machine language and placed on the Library tape. The code could then be called in by the query processor, and was the only way, apparently, that the user could perform a function not available in the language of IPS. IPS was also an outgrowth of the FICEUR (FICE-USNA62) a system developed by the Navy after TUFF-TUG was developed. Of particular interest in IPS was a hierarchical data structure to permit organizational relations and the fact that the front of the tape on which a data base existed contained the description of the data within a file. That is, the data description described the format of the data in the file.

An apparently independent development within the Navy was also developed at that time by Kosakoff. The system was called Variable Information Processor (VIP) (VIP-KOSA63). Vickers and Wang (GEIS-VICK61) at the General Electric Corporation developed a system called the General Electric Information System in the late 1950's, early 1960's, with some generalized capability. All of the above systems were tape oriented. Reliable mass memory hardware was not yet available.

The need for reliable mass memory access to data was particularly pressing for a system called ACSI-MATIC, (ACSI-MILL60) intended for intelligence operations by the U.S. Army. A prototype, non-disc oriented, version of the ACSI-MATIC system was designed by Gurk and Minker (ACSI-GURK61) that permitted certain complex search operations for determining associations between data of the form if 'a is related to b' and 'b is related to c' then 'a is related to c'. The prototype system was implemented in 1959. A system intended to be operational was designed by Minker and his colleagues (ACSI-MINK61) at RCA and was partially implemented in 1964. The system was perhaps the first to permit the use of magnetic disc storage and was designed with a multi-list structure with link addresses appearing in a directory pointing to data records, and in records themselves pointing to other related data entries. A primitive form of English was used in the query, and initially only the AND operator was permitted. Extensive checking was done on each input entry, to attempt to establish chains of relations between the input item and other entries in the system of files. Many of the design features of that system have been incorporated into the DM-1 system.

The input form provided for the user to specify queries was quite primitive in all the above systems. In 1961, Green, et al. (BASE-GREE61) developed a system called BASEBALL which, although not a generalized data management system, used a limited form of natural language with the vocabulary of baseball for an input language. The primary importance of BASEBALL is its use of a grammar and a parsing routine to analyze the almost natural language English query statements. The consideration of a query language that could be used as a formal language was due, perhaps, to Cheatham and Warshall (QUER-CHEA62) who described a language called QUERY and techniques for analyzing the syntax of the language. Current query languages generally use the approach described by Cheatham and Warshall.

One of the first published query systems was that by Climenson who described a system called Retrieval Command Oriented Language (RECOL) (RECO-CLIM63). The query language was designed and implemented for the RCA 501. The user could specify some five commands, and Boolean statements were permitted within some of the commands. The user specified his data description to the system at the time the query was posed. Using the data description, the query was first compiled. The compiled code binds the data, as described by the data description, to the program. A batch capability was provided to permit more efficient retrieval. It took the same time to answer five queries that were batched as it did to answer one query.

The Air Force, in the late 1950's, also started to develop a system called SAC/AIDS Formatted File System (SAC-JACK62) that was designed and implemented by IBM. The system was described in 1962. The ideas that existed in this system were carried over by IBM in 1965 to the development of the Formatted File System for DIA (FFS-DEFF66) and to the National Information Processing System (NIPS) (NIPS-IBMM68) National Military Command and Control System in 1968. Of the three, NIPS is the only system that used random access memory effectively for retrieving data. NIPS is a comprehensive data management system with many specialized programs and a sophisticated output system of use to the military.

The NIPS/360 system operates under OS/360. It consists of a set of software components which perform the function of file definition, file maintenance, retrieval, and output in dealing with a large set of data files which comprise the National Military Command and Control System. NIPS file structure permits logical data structures with only a two-level tree structure, a limitation of the system. In many applications several depths of hierarchy well beyond the two levels provided by NIPS, are required. The output reporting system of NIPS permits a wide range of formats and options. It is perhaps one of the more powerful output systems of any generalized data management system in existance. NIPS also appears to have been influenced by the Information Processing System (IPS) developed for the U.S. Navy by IBM.

Whereas IPS contained the data description with the data, Postley in 1962 described a system called GIRLS (GIRL-POST62) in which the data descriptions for all files were contained in a central directory. GIRLS was the forerunner of a series of five generalized data management systems developed by Informatics Inc. and culminating in the latest development, the MARK IV system. To date, although data may be stored on random access devices, MARK IV does not take advantage of disk and, with some minor exceptions must look at every data record to determine if the data satisfies the query. As previously noted, MARK IV requires a fixed query format. The prescribed format is contrasted with that of DM-1 and TDMS where the general query syntax is prescribed, but a fixed format is not necessary. The utility of each approach is dependent upon the application, and should be a study for human factors personnel.

Another significant and early system development was Advanced Data Management System (ADAM) (ADAM-BURR64) developed by Burrows and his colleagues at the MITRE Corporation. The effort was initiated in August 1962. ADAM was intended as a laboratory facility for design evaluation. A major objective was that of developing a computer environment in which new processes and procedures could be incorporated and evaluated. The system was able to generate user files, perform updating of files on-line, incorporate user application languages, provide on-line user request services, and generate reports. The ADAM design approach has influenced a number of systems such as COLINGO (COLI-ROBE64) developed by the MITRE Corp., and LUCID (LUCI-FRAN64) developed at SDC. The DM-1 routine INSCAN, which permits users to specify their own query language, was influenced heavily by work on ADAM.

As may be noted by referring to Appendix I and Appendix II, there have been numerous developments in the field of generalized data management systems. A description of each system would not be illuminating. Rather, it will be well to describe classes of data management systems. Dr. Peter Hill(1) of the AUERBACH corporation refers to five different design strategies for generalized data management systems. These are:

(1) file maintenance and retrieval systems,
(2) language extension systems,
(3) self-contained systems, and
(4) process-control systems.

The classes of systems are not mutually exclusive.

A file maintenance and retrieval system is oriented towards handling individual files and records. It is typified by a system such as the Navy's Information Processing System, described previously, or more recent systems such as the MARK IV or the Formatted File System (FFS).

A language extension system is one that provides facilities that permit one to define file structures and to implement retrieval functions. The language extension system operates within the context of a host language. The Integrated Data Store (IDS) (IDS-BACH64) developed at the General Electric Co. by Bachman is an instance of this class of systems. IDS operates in the procedural language COBOL. The user defines his file using normal COBOL conventions. IDS permits network relations to exist among data elements. In contrast to the file maintenance and retrieval systems that have built-in query languages, IDS does not provide a query language. The user must write his own query program. Because IDS does not provide a query capability some individuals do not consider it a generalized data management system. It is included as a generalized data management system by the CODASYL Committee.

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(1) I am indebted to Dr. Peter Hill and Dr. Jerome Sable of the AUERBACH Corp. for bringing this observation in design strategies to my attention. They are based on categories recognized by Dr. William Olle of RCA, but differ slightly in the terminology used by Dr. Olle.

A self-contained system is one in which the user must remain strictly within the system routines to perform all of his functions. The Time Shared Data Management System is an instance of this class of system. TDMS is an outgrowth of an earlier SDC system termed LUCID. Individuals who contributed to the design of TDMS are Bleier, Franks and Vorhaus. TDMS contains a non-procedural language, and a completely inverted, cross-indexed tree structure contained in a common data base file. An output system termed COMPOSE/PRODUCE provides a flexible output for the user. An on-line query capability is provided to the user. The ability to index data permits rapid retrieval to data stored on random access peripheral store. However, file maintenance operations are time consuming. A commercial version of the system, Commercial Data Management System (CDMS) is under development.

A process control system is one that has the ability to link application programs to data base files of different structure. The Data Manager-1 system designed by Sable of the AUERBACH Corp. is an instance of a process control system.

DM-1 consists of a set of service routines for retrieving and storing data. The service routines are designed as system primitives from which new system services and user functions can be built. The system provides for file definition, file creation, file updating and file interrogation. The Western Electric Company is developing a system termed SC-1 (SC-1-WELS67) which uses the design philosophy of DM-1. The AUERBACH Corp. assisted Western Electric with the design and part of the implementation of the system.

5. Trends in Generalized Data Management Systems

The technology of generalized data management systems is beginning to come of age and is relevant to both military and commercial problems. In the commercial areas, it will not be surprising to see, within the next few years, corporations that have a common data pool of many files that are handled by a single generalized management system. Most of the manufacturers are providing their users with systems that represent capabilities in this direction. For example, GIS-IBM (GIS-BRYA66), INFOL-CDC (INFO-CONT65), MANAGE-Scientific Data Systems (MANA-SCIE66), CRESTS-Honeywell (CRES-CRAI66) and UL/I RCA (UL/I-OLLE68). Some software companies, such as Informatics-MARK IV and Applications Software Inc.-ASI-ST (ASI-SUND68) have developed proprietary systems that can be obtained from these organizations.

It is useful to consider the developments that are likely to take place in this technology and the trends that are taking place now, since many of the developments will be useful for MIS. Although current GDMSs have many features of use for a MIS, additional features are required. These additional features are described, briefly, below.

a. Data Structure Flexibility

Current GDMSs are typically restricted to permit only tree-like data structures to be manipulated. There are many data structure types that are required to express relationships between data. General graph structures should be able to be described to the system and to be manipulated by the system programs. The General Electric Company's system, Integrated Data Store, permits flexible graph data structures, but the programmer must write his own basic program.

b. Physical Structure Definition Capability

It is desirable to be able to define the physical structures that reside within the system. Thus, if a new device is introduced into a computer system, one should be able to describe the physical structures of the device to the system, and have system programs generated that can take advantage of the equipment.

c. Data Transformation and Validation Capability

Given a file organized in accordance with one data description, a capability is required to describe a completely new data structure for the data and to have the system perform the reorganization and the checking of the data. Thus, if data enters from another computer, it can be transformed appropriately and the data items can be checked to determine whether or not they are valid (e.g., the data entry in a field may be required to be alphabetic while an error in the input results in a numeric field entry). When certain classes of errors arise they should be detected automatically by the system. IBM's Generalized Information System (GIS) has built in some capabilities for data checking on input. This is a step in the right direction. Furthermore, studies are required to determine which data structures can be transformed conveniently into one another, and the penalties that arise in making the transformations.

d. Data Masking Capabilities

In many applications the ability to investigate portions of a field are required. Most data management systems do not permit such a capability. If one wants to find an individual with specified values of the fourth and fifth digits of his social security number, it is difficult to express this to most systems as currently designed. IBM has also announced such a feature as part of its GIS system.

e. Data and Document Capabilities

Data management systems contain features that are most useful for document retrieval systems. However, additional features are required. The ability to scan natural language text is one requirement. Another requirement is the ability to search for documents when given weighted values of the index terms, such that the sum of the product of the index terms that describe the document times the corresponding weights exceeds a specified threshold. The system ISL under development by the Information Systems Leasing Corporation (GEN-CODA69) is said to contain some of these features.

f. Inferential Capabilities

Generalized Data Management Systems deal with the retrieval of data whose relations have been made explicit in the data base. There are many relations that can be extracted from a data base that are implicit within the system. A simple example is a data base in which there are records that contain the name, age, weight, sex and parents of individuals. Given the question of determining whether two individuals are first cousins requires that several queries be asked by the user, where each query is dependent upon the output of the previous query. Although a system can be developed that permits such a capability for the particular question above, the general area of developing inferences is much more complicated than the example just cited. In an inferential system one would have a file of theorems (for example, a theorem might be the definition of when two individuals are considered first cousins - such as 'A is the first cousin of B'implies that a parent of A is a sibling of a parent of B'. Based upon the stored file of facts and the stored theorems, a system with an inferential capability would automatically answer the question without user intervention. Developments in theorem proving, and heuristic methods will be required before such capabilities can be introduced. This subject is under active research. Two surveys of work in this area have been written by Simmons.(1)

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(1) The KWIC index and bibliography given in Appendix II does not cover work in question - answering systems or in theorem proving since they are not yet incorporated in generalized data management systems. The references to Simmons papers are:

- Simmons, R.F. Answering English Questions by Computer: A Survey. C. ACM 8, 1(Jan. 1965),53-70.
- Simmons, R.F. Natural Language Question Answering Systems: 1969. TNN-87, Computation Center, Univ. of Texas, Austin, Texas, January, 1969.

g. Common Data Base

The trend is decidedly that of having one centralized data base in which the data may be linked and related to one another. With the ability to have generalized programs, the use of central directories to locate data in a computer system facilitates the use of a common data base.

h. Job Linkage Capability

To be of general use to a Management Information System, or in a general computer environment, it is necessary to have a facility to link programs that are in the computer environment with programs and data within the generalized data management system. The user should then have the ability through a language to express the operations that he desires. MIS's will suffer until such capabilities become a reality.

i. System Self-Monitoring and Self-Adapting

The use of a generalized data management system and a common data base can be self-defeating. There are, in many systems, data bases that reside in the high speed memories within the system that are rarely used. These data bases occupy valuable, expensive, memories. A GDMS must have capabilities built-in which permit one to determine such statistics as the frequency of use of files, the types of queries that are most frequently asked, the time between requests, and the time that it takes during various phases of the GDMS operationsto perform certain functions. Armed with facts such as these, data not generally used can be retired to less costly and less accessible store.

The GDMS code can be investigated to determine if it can be made more efficient when performing high-frequency tasks. A GDMS that does not have such a capability in the future will be greatly limited. Such a capability permits management to better monitor, evaluate and manage the common data base.

j. Man-Machine Interactive Capability

The ability of a system to operate in an on-line environment with a man at a console is important. Because of the diversity of information in the machine, the management of a corporation cannot be expected to know the details of how to retrieve information from the system. With a console at the user's desk, and with a dialog-capability, the machine can help the user formulate his query and respond to the query. Without an on-line dialog capability, top management will need a layer of technical support to obtain results from the computer. The hope is that an on-line dialog will give top-management ready access to the source of information.

6. Summary

There is no doubt that generalized data management systems are important and that they will play a major role in industry as they have in military applications. A GDMS will be a major ingredient of a MIS. A second major ingredient is the application programs that characterize the needs of management. The combination of the two will provide management with a flexible tool. One might well ask when powerful MIS systems will become available. It is always risky business to make predictions. It has taken data management systems somewhat over ten years to first grow up. It is likely that in another ten years, systems of significance for MIS should be well under development. There are many developments that must take place and much that is to be learned. A Generalized Data Management System is large and complex. The larger the system the more problems one has. Several such systems have taken a considerable length of time to develop, and many delays have been evidenced. The experience described in (ADAM-CONN67) on ADAM indicates the problems that one may encounter when using and designing a GDMS. However, with time, better techniques will be devised to permit one to achieve effective designs and implementation of such systems.

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APPENDIX I

In this appendix, the numerous systems that are relevant to Generalized Data Management System technology are listed in chart form. For each entry in the chart, the following items are listed when they are known:

(1) the acronym for the system;
(2) the date described in the literature, or the date of a known document that relates to the system;
(3) the approximate date that the system was implemented;
(4) the designer(s) of the system;
(5) the system originators for the work; and
(6) the computer(s) on which the system was implemented.

Following the chart in Table 1 are listed the acronyms of GDMSs and their full name. In Table 2, are listed the abbreviation of the organization responsible for the design of a GDMS as listed in the chart and the full name of the organization. The writer makes no claims as to the completeness of the systems listed. There are undoubtedly some systems that should appear in the chart and are not cited. Furthermore, as the paper was in preparation, some new systems have come to the attention of the writer that have not been included for lack of information.

Some of the entries listed in the chart are based upon the recollections of the writer. Hence, in some instances the accuracy of the entry may be subject to question. It is, further, extremely difficult to determine the approximate date of implementation of a system, its current status, and the precise individual responsible for the design of a system. Where it was difficult to determine the name of the designer from the literature, the organization's name was listed, unless it was known to the writer through personal contacts. The writer apologizes for any errors in the chart, or to any individuals who may be offended by error or omission. He will be pleased to make corrections when they are brought to his attention.

GENERALIZED DATA MANAGEMENT SYSTEM SUMMARY CHART

SYSTEM NAME	DATE DESCRIBED IN LITERATURE	APPROXIMATE DATE IMPLEMENTED	DESIGNER	SYSTEM ORIGINATOR	COMPUTER
1) ALERT	1960	1960	Kellogg	TRW	RW-400
2) ACSI-MATIC	1961	1960	Gurk/Minker	RCA	IBM 704
3) ACSI-MATIC	1961	1964 (partially implemented)	Minker et al.	RCA	Sylvania 9400
4) BASEBALL	1961	1961	Green/Wolf/ Chomsky/Laughery	MIT/Lincoln Lab	IBM 7090
5) GE Inf. Sys.	1961	1962	Vickers/Wang	GE	IBM 7090
6) ADAM	1962	1966	Burrows et al.	MITRE	IBM 7030 (Stret
7) AFIC	1962	1962	IBM	IBM	IBM 7090
8) AIRS	1962	1958	Dennis/Hubbell	GE	IBM 7090
9) ASO	1962	1963	Prywess/ Zimmerman	Univ. of Penn., Moore School	IBM 1401
10) COLINGO	1962	1962	Spitzer et al.	MITRE	IBM 1401
11) FICEUR	1962		IBM	USNFIC & IBM	IBM 1410
12) GIRLS	1962	1962	Postley	AIS & Douglas	IBM 7090
13) QUERY	1962	not implemented	Cheatham/Warshall	COMPASS	--------
14) SAC-AIDS	1962		IBM	IBM	IBM 7094
15) TUFF-TUG	1962	1961	Vesper	DTMB	IBM 704/7090
16) VIP	1962	1962	Kosakoff/ Buswell	NOL	IBM 7070
17) RECOL	1963	1962	Climenson	RCA	RCA 501

GENERALIZED DATA MANAGEMENT SYSTEM SUMMARY CHART

SYSTEM NAME	DATE DESCRIBED IN LITERATURE	APPROXIMATE DATE IMPLEMENTED	DESIGNER	SYSTEM ORIGINATOR	COMPUTER
18) XD-1	1963		Cataldo	MITRE	XD-1
19) 473-L	1964	(system terminated)	Barlow/Cease	IBM	IBM 1401/1410 Librascope L-3055
20) IDS	1964	1966	Bachman	GE	GE 625/635 425/435 225/235
21) IPS	1964	1965	IBM/NAVCOSSACT	IBM/NAVCOSSACT	CDC 1604A
22) LUCID	1964	1964	Franks	SDC	AN/FSQ-32
23) SEA SURVEILLANCE	1964	1967	NAVCOSSACT	NAVCOSSACT	CDC 1604 A
24) AESOP	1965	1965	Bennett/Haines/ Summers	MITRE	IBM 7030 (Stretch)
25) BEST	1965	1964	Ziegler	NCR	NCR 315
26) DM-1 (also called AIMS & Reliability Central)	1965	1969 UNIVAC M1218	Sable	Auerbach	UNIVAC M1218 GE 635
27) INFOL	1965	1967	Olle	CDC	CDC 3600, 3800
28) MADAM	1965	1966	Crossley	SDC	IBM 1401 IBM S/360/30 IBM TOS/360
29) MGH	1965	1966	Barnett et al.	BBN	PDP-1
30) SPAN	1965	1968	Almendinger	SDC	IBM 7090
31) TDMS (CDMS-Commercial Version of TDMS)	1965	1968	Bleier/Franks/ Vorhaus	SDC	IBM S/360/50/ADEP IBM S/360/65/TS/ EXEC
32) APL	1966	1966	Dodd	General Motors	IBM S/360

GENERALIZED DATA MANAGEMENT SYSTEM SUMMARY CHART

SYSTEM NAME	DATE DESCRIBED IN LITERATURE	APPROXIMATE DATE IMPLEMENTED	DESIGNER	SYSTEM ORIGINATOR	COMPUTER
33) CRESTS	1966		Craig	Honeywell	H2200
34) FFS/DIA	1966	1966	IBM	IBM	IBM 1410
35) GIS	1966	1969 (GIS-BASIC)	Bryant/Semple	IBM	IBM OS/360
36) GRED	1966	1966	Heiner/Leishman	Thiokol	IBM 7040/7070
37) ICS	1966		No. Am./IBM	No. Am./IBM	IBM OS/360
38) IMRADS	1966	(not implemented) (See ISL-1)	Hawes	UNIVAC	UNIVAC 1108
39) MARK III	1966	1967	Postley	Informatics	IBM 1401/1410
40) MANAGE	1966	1967	SDS	SDS	SDS 900 Series SDS 9300
41) RFMS (similar to TDMS)	1966		Dale/Morris/ Deline/ Autrey	Univ. of Texas	IBM S/360
42) SURF	1966		Wallace	SDC	
43) C-10	1967	1967	Steil	MITRE	IBM 1410
44) FORGE	1967	1967	Burroughs	Burroughs	B-5500
45) GIM-1	1967	1968-69	Nelson/Andrews	TRW	IBM 7094 GE 635 IBM 360
46) GIRS	1967		Plaskow	Compass	
47) MARK IV	1967	1968	Postley	Informatics	IBM OS/360 IBM DOS/360
48) PDQ	1967	1967	ADR	ADR	IBM S/360 Mod 30 up.

GENERALIZED DATA MANAGEMENT SYSTEM SUMMARY CHART

SYSTEM NAME	DATE DESCRIBED IN LITERATURE	APPROXIMATE DATE IMPLEMENTED	DESIGNER	SYSTEM ORIGINATOR	COMPUTER
49) RAPIDS	1967	1968	CDC	CDC/U.S. Army	CDC 3300
50) SC-1 (SC-1 is a part of the DM-1 design)	1967	1969	Welsh/Nelson (Sable-Auerbach)	Western Elec. Auerbach	IBM S/360 Mod. 40H and up
51) ASI-ST	1968	1968	Sundeen	ASI	IBM 360 SDS Sigma 5/7 RCA Spectra 70
52) AEGIS	1968	1969	Programmatics	Programmatics	IBM DOS/360 IBM OS/360 (with o without teleprocessing)
53) COGENT II	1968	1968	CSC	CSC	IBM OS/360 IBM DOS/360 UNIVAC 1107/1108 IBM 7044, 7090 RCA SPECTRA 70
54) FFS/NIPS	1968	1968	IBM	IBM	IBM OS/360
55) IMS	1968		IBM	IBM	IBM OS/360
56) MIS	1968	1968	Semple	IBM	IBM OS/360
57) QWICK QUERY	1968	1968	CACI	CACI	IBM 1401/1460
58) SELECT	1968		Regan/Swallow	Standard Oil	IBM 1401/1460
59) UL/1	1968	1969	Olle	RCA	RCA Spectra 70
60) COGENT III	1969		CSC	CSC	IBM OS/360 IBM DOS/360
61) GIPSY	1969	1969	Sweeney	Univ. of Okla.	IBM S/360 (batch on teleprocessing)

GENERALIZED DATA MANAGEMENT SYSTEM SUMMARY CHART

SYSTEM NAME	DATE DESCRIBED IN LITERATURE	APPROXIMATE DATE IMPLEMENTED	DESIGNER	SYSTEM ORIGINATOR	COMPUTER
62) ISL-1	1969	1969	Hawes	ISL	IBM 360/30, 40 RCA Spectra 70, UNIVAC 1108 Burroughs B-55
63) IRS	1969	1969	Sheer	Sigma Data Corp.	IBM 360/30 RCA Spectra 70
64) SCORE	1969	1969	Atlantic Software	Atlantic Software	IBM S/360 mod. RCA Spectra 70 35 up Honeywell H200 120 up UNIVAC 1108 Burroughs B-55
65) INFORM	1969	1969	General Analytics	General Analytics	IBM 360/30 up RCA Spectra 70

ACRONYMS of Generalized Data Management Systems

TABLE - 1

ACSI-MATIC	Office of Assistant Chief of Staff for Intelligence Automatic System
ADAM	Advanced Data Management System
AEGIS	An Existing General Information System
AESOP	An Evolutionary System for On Life Planning
AFIC	Air Force Intelligence Center System
AIMS	Advanced Information Management System (Name changed to DM-1)
AIRS	Automatic Information Retrieval System
ALERT	Automated Linguistic Extraction Retrieval Technique
APL	Associative Programming Language
ASI-ST	Application Software Incorporated-System Techniques
ASO	Aviation Supply Office Inventory Retrieval System
BASEBALL	(no significance to the acronym except that the application domain was baseball)
BEST	Business EDP System and Techniques
C-10	COLINGO for the 1410
CDMS	Commercial Data Management System (Commercial version of TDMS)
COGENT	COBOL GENerator and Translator
COLINGO	Compile On-LINe and GO
CRESTS	Courtald's Rapid Extract, Sort and Tabulate System
DM-1	Data Manager-1
FFS	Formatted File System
FFS/DIA	Formatted File System/Defense Intelligence Agency
FFS/NIPS	Formatted File System/National Information Processing System
FICEUR	Fleet Intelligence Center Europe
FORGE	File Organization Generator
GE INF SYST	General Electric Information System
GIM-1	Generalized Information Management System
GIPSY	Generalized Information Processing System
GIRLS	Generalized Information Retrieval and Listing System
GIRS	Generalized Information Retrieval System
GIS	Generalized Information System
GRED	Generalized Random Extract Device

ICS	Information Control System
IDS	Integrated Data Store
IMRADS	Information Management Retrieval and Dissemination System
IMS	Information Management System
INFOL	Information Oriented Language
INFORMS	Information Organization Reporting and Management System
IPS	Information Processing System
IRS	Information Retrieval System
ISL-1	Information System Leasing System
LUCID	Language for Utility Checkout and Instrumentation Development or Language Used to Communicate Information System Design
MADAM	Moderately Advanced Data Management System
MANAGE	SDS 9 Series MANAGE
MARK	Mark File Management System
MGH	Massachusetts General Hospital System
MIS	Management Information System
PDQ	Program for Descriptor Query
QUERY	Query Language
QWICK Query	Quick Query Program
RAPIDS	RAndom excess Personnel Information and Dissemination System
RECOL	Retrieval Command Oriented Language
RFMS	Remote File Management System
SAC-AIDS	Strategic Air Command
SC-1	System Control-1
SCORE	(unknown)
Sea Surveillance	Sea Surveillance System
SELECT	Select
SPAN	Socioeconomic Planning and Analysis System
SURF	Support of User Records and Files
TDMS	Time-Shared Data Management System
TUFF-TUG	Tape Updates for Formatted Files--Format Table Tape Updater and Generator
UL-1	User Language-1

VIP	Variable Information Processor
XD-1	XD-1
473L	U.S. Air Force Command and Control System Query Language

Abbreviations of Organizations Used in GDMS Summary Chart

TABLE - 2

ADR	Applied Data Research
AIS	Advanced Information Systems, Inc.
Atlantic Software	Atlantic Software, Inc.
Auerbach	Auerbach Corporation
BBN	Bolt Beranek & Newman
Burroughs	Burroughs Corporation
CACI	Consolidated Analysis Centers, Inc.
CDC	Control Data Corporation
COMPASS	Massachusetts Computer Association, Inc.
DTMB	David Taylor Model Basin (was known as Naval Ship Research Development Center)
Douglas	Douglas Aircraft Co.
GE	General Electric Co.
General Motors	General Motors Corporation
Honeywell	Honeywell, Incorporated
IBM	International Business Machines, Inc.
Informatics	Informatics, Inc.
ISL	Information Systems Leasing Corporation
MIT	Massachusetts Institute of Technology
MITRE	MITRE Corporation
NAVCOSSACT	Naval Command Ship Support Activity
No. Am.	North American Aviation Corporation
NOL	Naval Ordnance Laboratory
NCR	National Cash Register Corporation
Programmatics	Programmatics, Inc.
RCA	Radio Corporation of America
SDC	System Development Corporation
Sigma Data Corp.	Sigma Data Corporation
Sylvania	Sylvania Corporation
Thiokol	Thiokol Chemical Corporation
TRW	Thompson-Ramo-Woolridge Corp.
UNIVAC	UNIVAC Corporation
Univ. of Oklahoma	University of Oklahoma Computing Center
Univ. of Pa.	University of Pennsylvania
Univ. of Texas	University of Texas
USN FIC	United States Navy Fleet Intelligence Center
Western Elec.	Western Electric Corporation

APPENDIX II

Key Word in Context Index
To
Generalized Data Management Systems

by Jack Minker
Elizabeth Fong
Daniel H. Fishman

The KWIC index that follows is restricted primarily to Generalized Data Management Systems. There are a number of papers cited that are not strictly on GDMSs. These citations are included since they cover topics, or techniques, particularly relevant to the subject matter of GDMS. Although several papers relate to question-answering systems, such systems were excluded from this index. To have included all such systems would have required expanding the KWIC index to include topics in automatic theorem proving. At a later date it might be advisable to expand the KWIC index to include question-answering systems.

With few exceptions, for each of the systems listed in Appendix I, at least one citation exists in the index. The code used for the KWIC index for each citation was some form of the acronym for the system.

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NIPS-IBA368                      ANALYTICAL      MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL.III, GENERA
NIPS-IBA468                      ANALYTICAL      MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL.IV, ERROR P
 GEN-GIER67                      ANAYSIS         OF EXISTING AND PROPOSED DATA HANDLING SYSTEM =
RELA-KUHN67                      ANSWERING       QUESTIONS BY COMPUTER: A LOGICAL STUDY =
IPS-FOST64    ESSING FOR THE     AN/FYK-(V)      DATA PROCESSING SET =THE INFORMATION PROC
IPS-IBM064    SYSTEM FOR THE     AN/FYK-1(V)     DATA PROCESSING SET - PHASE II.=USER'S MANUAL FOR INFORMATION PROCESSING
APL-KENN65    MPUTERS TO THE     APL             STORAGE AND RETRIEVAL SYSTEM =THE APPLICATION OF CO
APL-DODD66                       APL             - A LANGUAGE FOR ASSOCIATIVE DATA HANDLING IN PL/1 =
AIDS-IBM565   M (AIDS).VOL.V.    APPENDIX        =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTE
AIDS-IBM265   IDS).VOLUME II.    APPENDIX        =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (A
AIDS-IBM365   (AIDS).VOL.III.    APPENDIX        =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM
AIDS-IBM465    (AIDS).VOL.IV.    APPENDIX        =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM
AIDS-IBMA65   AIDS).VOLUME I.    APPENDIX        =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (
 GEN-ROSE64                      APPLICATION     OF SERIAL AND PARALLEL FILE STRUCTURES TO COMMAND AND CONTROL SYSTEM =
 GEN-MORE67                      APPLICATION     OF LEVEL CHANGING TO A MUTLILEVEL STORAGE ORG. =
 GEN-GHOS66                      APPLICATION     OF FINITE GEOMETRY IN FILE ORGANIZATION FOR RECORDS WITH MULTIPLE-VALUED ATTRI
APL-KENN65               THE     APPLICATION     OF COMPUTERS TO THE APL STORAGE AND RETRIEVAL SYSTEM =
MARS-POST65   T: GENERALIZED     APPLICATION     PROGRAMS =FILE MANAGEMEN
 GEN-POST66   ILE MANAGEMENT     APPLICATION     PROGRAMS =F
GIS-IBMC65    RMATION SYSTEM     APPLICATION     DESCRIPTION =GENERALIZED INFO
GIS-IBMA67    CESSING SYSTEM:    APPLICATION      DESCRIPTION =IBM SYSTEM/360 DOCUMENT PRO
GIS-IBMXX                GIS     APPLICATION     DESCRIPTION MANUAL =
GIS-IBMCIX       GIS (BASIC)     APPLICATION     DESCRIPTION MANUAL =
GIMI-TRWD66   - A GIM SAMPLE     APPLICATION     =GIM-IM PERSONNEL ACCOUNTING
IMS-IBMA68    M DESCRIPTION)     APPLICATION     DESCRIPTION MANUAL =INFORMATION MANAGEMENT SYSTEM/360 FOR THE IBM SYSTEM/360 (
DEAC-THOM64              THE     APPLICATION     AND IMPLEMENTATION OF DEACON-TYPE SYSTEMS =
 GEN-HIBB62   S WITH             APPLICATIONS    TO SEARCHING AND SORTING =SOME COMBINATIONAL PROPERTIES OF CERTAIN TREE
 GEN-KAUF66   TECHNIQUES AND     APPLICATIONS    =THE IBM TECHNICAL INFORMATION RETRIEVAL CENTER SYSTEM
 GEN-LARS66    AND RETRIEVAL     APPLICATIONS    =DATA FILTERING APPLIED TO INFORMATION STORAGE
 GEN-PICT68   D SYSTEMS WITH     APPLICATIONS    TO INFORMATION RETRIEVAL, A SELECTIVE BIBLIOGRAPHY =FILE-MANAGEMENT TECHNIQUES
UL/1-OLLE68   O FOR DOCUMENT     APPLICATIONS    =UL/1: A USER LANGUAGE ALS
INFO-OLLE66   MENT RETRIEVAL     APPLICATIONS     =USE OF INFOL FOR DOCU
INFO-OLLE67   ND   RETRIEVAL     APPLICATIONS     =INFOL: A GENERALIZED LANGUAGE FOR INFORMATION STORAGE A
COLI-COTA65   E COLINGO-LIKE     APPROACHES      TO THE DATA BASE PROBLEM=THRE
 GEN-DILL66   IONS REGARDING     ARRANGEMENT     OF RECORDS ON MAGNETIC TAPE =SOME CONSIDERAT
CONV-KELL68   IONS INTO          ARTIFICIAL      LANGUAGE QUERIES =ON-LINE TRANSLATION OF NATURAL LANGUAGE QUEST
ASI-APPL68    NTRODUCING THE     ASI-ST          GENERAL PURPOSE INFORMATION MANAGEMENT SYSTEM =I
ASI-SONJ68                       ASI-ST           A GENERAL PURPOSE INFORMATION MANAGEMENT SYSTEM =
ASO-PERR63     REPORT ON THE     ASO             EXECUTIVE ROUTINE =TECHNICAL
MULT-PRYW62   ULTI-LIST TYPE     ASSOCIATIVE     MEMORY =THE M
APL-DODD66    A LANGUAGE FOR     ASSOCIATIVE     DATA HANDLING IN PL/1 =APL -
ASSS-NAVO67                      ATLANTIC        SEA SURVEILLANCE SYSTEM =
ASSS-NAVC67                      ATLANTIC        SEA SURVEILLANCE SYSTEM =
 GEN-GHOS68   ULTIPLE-VALUED     ATTRIBUTES      =APPLICATION OF FINITE GEOMETRY IN FILE ORGANIZATION FOR RECORDS WITH M
AIMS-AUER65   IPTION OF AIMS,    AUERBACH        INFORMATION MANAGEMENT SYSTEM=A DESCR
473L-HEIS64   A FINITE-STATE     AUTOMATION      =AN EXECUTIVE SYSTEM IMPLEMENTED AS
ASO-ZIMM64             NAVAL     AVIATION        SUPPLY OFFICE INVENTORY RETRIEVAL SYSTEM =
 GEN-LAMB63              THE     BALANCED        TREE AND ITS UTILIZATION IN INFORMATION RET. =
GIMI-HELS66   NGUAGE    DATA     BANKS           =GENERALIZED INFORMATION MANAGEMENT FOR MULTIPLE LA
 GEN-LOWE66   LUENCE OF DATA     BASE            CHARACTERISTICS AND USAGE ON DIRECT ACCESS FILE ORGANIZATION =THE INF
 GEN-ALLE66   : A LARGE DATA     BASE            MANAGEMENT SYSTEM =OMNIBUS
 GEN-TURN65    CENTERED DATA     BASE            SYSTEMS IN SUPPORT OF HIGH MILITARY COMMAND =COMPUTER
 GEN-BUCK66   -CENTERED DATA     BASE            SYSTEMS =COMPUTER
 GEN-CODA69   NERALIZED DATA     BASE            MANAGEMENT SYSTEMS =A SURVEY OF GE
AIDS-BRTA64    MANAGING DATA     BASE            OPERATION =AIDS EXPERIENCE IN
 GEN-PATR64   ING OF A DATA      BASE            =ADAPTING MASS STORAGE EQUIPMENT FOR THE HANDL
 GEN-SUCH65   -CENTERED DATA     BASE            SYSTEMS =THE 2ND SYMPOSIUM ON COMPUTER
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GEN-WALK04    -CENTERED DATA   BASE              =PROCEEDINGS OF THE SYMPOSIUM ON DEVELOPMENT AND MANAGEMENT OF A COMPUTER
GEN-LAND09    IOGRAPHIC DATA   BASE              INTERACTION, COMPATIBILITY AND STANDARDIZATION =CLASSIFIED BIBLIOGRAPHY ON BI
GEN-THOM08    THROUGH A DATA   BASE              =A PROPOSED STRUCTURE FOR DISPLAYED INFORMATION TO MINIMIZE SEARCH TIME
GEN-HEAD05              DATA   BASE              SYMPOSIUM =
SC-1-HILS06   E LOGICAL DATA   BASE              - ITS CONCEPTS,DEVELOPMENT AND USE =TH
GEN-BAUM05    -CENTERED DATA   BASE              SYSTEMS =PROC.OF THE SECOND SYMPOSIUM ON COMPUTER
ISAR-DRAJ05   YSTEM FOR DATA   BASE               PROCESSING (ISAR BASE) =GENERAL PURPOSE EXTERNAL MEMORY S
IDS-BACH07    ATA STORE:DATA   BASE              STUDY =INTEGRATED D
COLI-COTA05   ES TO THE DATA   BASE              PROBLEM=THREE COLINGO-LIKE APPROACH
BASE-WOLF03              THE   BASEBALL          PROGRAM: AN AUTOMATIC QUESTION-ANSWERER,VOL.I =
DAPL-SIN000   RARCHICAL DATA   BASES              =DATAPLUS - A LANGUAGE FOR REAL TIME INFORMATION RETRIEVAL FROM HIE
UL/1-OLLE08   ION  FORM DATA   BASES             =UL/1: A NON-PROCEDURAL LANGUAGE FOR RETRIEVING INFORMAT
RFMS-DALE00                    BASES             FOR IMPROVED INFORMATION SYSTEMS =
ISAR-DRAJ05   OCESSING (ISAR   BASE)             =GENERAL PURPOSE EXTERNAL MEMORY SYSTEM FOR DATA BASE PR
BASE-GREE01                    BASE-BALL          AN AUTOMATIC QUESTION-ANSWER =
BIRS-VIN500   TRIEVAL IN THE   BEHAVIORAL        SCIENCES =BIRS: A SYSTEM OF GENERAL PURPOSE COMPUTER PROGRAMS FOR INFORMATION
BEST-NATOXX   TION. A SAMPLE   BEST              PROGRAM =GENERAL INFORMA
BEST-NATIXX                    BEST(BUSINESS     EDP SYSTEMS TECHNIQUE): A MAJOR BREAKTHROUGH IN COMPUTER PROGRAMMING =
GEN-LAND09    IBLIOGRAPHY ON   BIBLIOGRAPHIC      COMPATIBILITY, AND STANDARDIZATION =CLASSIFIED B
GEN-LAND09    IBLIOGRAPHY ON   BIBLIOGRAPHIC     DATA BASE INTERACTION, COMPATIBILITY AND STANDARDIZATION =CLASSIFIED B
GEN-LAND09        CLASSIFIED   BIBLIOGRAPHY      ON BIBLIOGRAPHIC DATA BASE INTERACTION, COMPATIBILITY AND STANDARDIZATION =
GEN-LAND09        CLASSIFIED   BIBLIOGRAPHY      ON BIBLIOGRAPHIC, COMPATIBILITY, AND STANDARDIZATION =
GEN-PIET08    L, A SELECTIVE   BIBLIOGRAPHY      =FILE-MANAGEMENT TECHNIQUES AND SYSTEMS WITH APPLICATIONS TO INFORMATION RETRI
BIRS-VIN508                    BIRS               A SYSTEM OF GENERAL PURPOSE COMPUTER PROGRAMS FOR INFORMATION RETRIEVAL IN TH
BEAC-THOP04           BEACON   BREADBOARD        SUMMARY =
BEAC-CRAI04           BEACON   BREADBOARD        GRAMMAR =
BEST-NATIXX   IQUE): A MAJOR   BREAKTHROUGH       IN COMPUTER PROGRAMMING =BEST(BUSINESS EDP SYSTEMS TECHN
CODE-COMPXX   AL INFORMATION   BROCHURE          =COGENT II GENER
MOLT-PRYW05                    BROWSING          IN AN AUTOMATED LIBRARY THROUGH REMOTE ACCESS =
GEN-SEVE07      THE NATIONAL   BUREAU            OF STANDARDS REPORT TO THE AGENCY FOR INTERNATION DEVELOPMENT: SELECTION OF A
MARK-INF007   RE PRODUCT FOR   BUSINESS          DATA PROCESSING =MARK IV FILE MANAGEMENT SYSTEM,THE GENERAL PURPOSE SOFTWA
BEST-ZIE005   AR APPROACH TO   BUSINESS          EDP PROBLEM SOLVING =A MODUL
SPAN-ALME05   STRATIFICATION   CAPABILITY        =SPAN REFERENCE MANUAL: SPAN-DATA-TRANSFORMATIONS AND
TDMS-WILL07   PORT GENERATOR   CAPABILITY        WITHIN THE SDC TIME-SHARED DATA MANAGEMENT SYSTEM =COMPOSE/PRODUCE:A USER-ORIE
GEN-TURN05          COMPUTER   CENTERED          DATA BASE SYSTEMS IN SUPPORT OF HIGH MILITARY COMMAND =
DACE-BARN05      RELIABILITY   CENTRAL           DATA MANAGEMENT SYSTEM IN: RUBINOFF, M. (ED.). TOWARD A NATIONAL INFORMATION S
GEN-BARN05       RELIABILITY   CENTRAL           DATA MANAGEMENT SYSTEM =
DM-1-SAB300      RELIABILITY   CENTRAL           AUTOMATIC DATA PROCESSING SUBSYSTEM, VOL III: DATA MANAGEMENT SYSTEM SURVEY =
DM-1-SAB100      RELIABILITY   CENTRAL           AUTOMATIC DATA PROCESSING SUBSYSTEM, VOL I: DESIGN SPECIFICATION REPORT =
DM-1-SABL05   OF RELIABILITY   CENTRAL           DATA MANAGEMENT SUBSYSTEM FINAL REPORT =DESIGN
DM-1-SAB200      RELLABILITY   CENTRAL           AUTOMATIC DATA PROCESSING SUBSYSTEM, VOLII: DESIGN SPECIFICATION REPORT =
DM-1-BARN05      RELIABILITY   CENTRAL           DATA MANAGEMENT SYSTEM =
GEN-LAWS02        THE USE OF   CHAIN             LIST MATRICES FOR THE ANALYSIS OF COBOL DATA STRUCTURES =
GEN-JOHN01       AN INDIRECT   CHAINING          METHOD FOR ADDRESSING OF SECONDARY KEYS =
GEN-EDP205            COMING   CHANGES           IN SYSTEM ANALYSIS AND DESIGN =
GEN-MORE07    ATION OF LEVEL   CHANGING          TO A MUTLILEVEL STORAGE ORG. =APPLIC
GEN-LOWE08    E OF DATA BASE   CHARACTERISTICS   AND USAGE ON DIRECT ACCESS FILE ORGANIZATION =THE INFLUENC
TOFF-VESPXX                    CINCPAC           EDPS USER MANUAL, VOL.1 =
IPS-IBMF02    RIPTION OF THE   CINCPACOPCON      INFORMATION PROCESSING SYSTEM =PRELIMINARY FUNCTIONAL DESC
GEN-DAVI05                     CLASSIFICATION    AND EVALUATION OF INFORMATION SYSTEM DESIGN TECHNIQUES =
GEN-LAND09                     CLASSIFIED        BIBLIOGRAPHY ON BIBLIOGRAPHIC, COMPATIBILITY, AND STANDARDIZATION =
GEN-LAND09                     CLASSIFIED        BIBLIOGRAPHY ON BIBLIOGRAPHIC DATA BASE INTERACTION, COMPATIBILITY AND STANDAR
GEN-FRED05    CHINE LINES IN   COBOL             =ACROSS MA
GEN-LAWS02    HE ANALYSIS OF   COBOL              DATA STRUCTURES =THE USE OF CHAIN LIST MATRICES FOR T
NIPS-100100   NCES AND) ERROR  CODES             =OPERATORS MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL.
NIPS-104900    .IX(A):  ERROR  CODES             (REVISED) =SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL
475L-104002            OIC-A   CODING            SPECIFICATION,VOLUME 2 =
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                                         COGENT           II =
COGE-COMP68                              COGENT           II FILE MANAGEMENT SYSTEM,GENERAL INFORMATION MANUAL=
COGE-COM068                              COGENT           II GENERAL INFORMATION BROCHURE =
COGE-COMPXX                              COLINGO          'D' SYSTEM DESCRIPTION =
COLI-ROBE64          USSTRICOM           COLINGO          'D' A CONTROL LANGUAGE FOR US STRIKE COMMAND =
COLI-MITR64                              COLINGO          C-10 USER'S MANUAL VOL.1: BASIC USER'S GUIDE, SERIES 3: PROFILE =
COLI-STEI66                              COLINGO          SYSTEM DESIGN PHILOSOPHY =
COLI-SPIT64                    THE       COLINGO          APPROACHES TO THE DATA BASE PROBLEM=
COLI-COTA65                  THREE       COLINGO-LIKE     DATA ON THE PROGRAM SYSTEM DESIGN (REFERS TO THE PHASE II SAC/AIDS SYSTEM) =
SAC-JACK62                               COLLECTED        ON INF. RETRIEVAL =RELIABILITY CENTRAL DATA MANAGEMENT SYSTEM IN: RUBINOFF, M.
DACC-BARR65       D ANNUAL NATL.         COLLOQUIUM       PROPERTIES OF CERTAIN TREES WITH APPLICATIONS TO SEARCHING AND SORTING =
  GEN-HIBB62                  SOME       COMBINATIONAL    CHANGES IN SYSTEM ANALYSIS AND DESIGN =
 .GEN-LOP265                             COMING           AND CONTROL SYSTEM =APPLICATION OF SERIAL AND PARALLEL FILE STRUC
  GEN-ROSE64      TURES TO               COMMAND          AND CONTROL =THE ORGANIZATIO
MULT-PRYM64       N OF FILES FOR         COMMAND           =COMPUTER CENTERED DATA BASE SYSTEMS IN SUPPORT OF HIGH
  GEN-TURN65              MILITARY       COMMAND          AND CONTROL SYSTEM QUERY LANGUAGE=HEA
 473L-BARL64      DQUARTERS,USAF         COMMAND          LANGUAGE =RECOL
 RECO-CLIM63       = A RETRIEVAL         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM600      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM108      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM408      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM500      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM600      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM400      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM800      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM300      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM700      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM800      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 NIPS-IBM208      IONAL MILITARY         COMMAND          SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-
 COLI-MITR64       FOR US STRIKE         COMMAND          =COLINGO 'D' A CONTROL LANGUAGE
 DEAC-CRAI63      AN-MACHINE             COMMUNICATION     =GRAMMATICAL ASPECTS OF A SYSTEM FOR NATURAL M
 SPAN-FRAN66      SPAN AND TUMS          COMPARED          =GENERAL PURPOSE DATA MANAGEMENT SYSTEMS FOR ADMINISTRATIVE AND FOR SOCIOECON
 TUMS-FRAN66      SPAN AND TUMS          COMPARED         =GENERAL PURPOSE DATA MANAGEMENT SYSTEMS FOR ADMINISTRATIVE AND FOR SOCIOECONO
  GEN-DOAK67      ETHODOLOGY FOR         COMPARISON       OF GENERALIZED DATA MANAGEMENT SYSTEMS: PEGS (PARAMETRIC EVALUATION OF GENERAL
  GEN-ZIEM67      MANAGEMENT - A         COMPARISON       OF SYSTEM FEATURES =DATA
  GEN-LAND69      BIBLIOGRAPHIC,         COMPATIBILITY     AND STANDARDIZATION =CLASSIFIED BIBLIOGRAPHY ON
  GEN-LAUD69         INTERACTION,        COMPATIBILITY    AND STANDARDIZATION =CLASSIFIED BIBLIOGRAPHY ON BIBLIOGRAPHIC DATA BASE
 CONV-KELL66      TURAL LANGUAGE         COMPILER         FOR ON-LINE DATA MANAGEMENT =A NA
 ALER-KELL60            THE FACT         COMPILER          A SYSTEM FOR THE EXTRACTION, STORAGE, AND RETRIEVAL OF INFORMATION =
 NIPS-101607      ENERAL PURPOSE         COMPONENT          PART VI. OUTPUT =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS
 NIPS-102108      ENERAL PURPOSE         COMPONENT          PART I. GENERAL SUPPORT =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYST
 NIPS-101407      ENERAL PURPOSE         COMPONENTS         PART IV.RETRIEVAL AND SORT PROCESSOR (RASP) =PROGRAM DESCRIPTION: NMCS INFORM
 NIPS-101507      ENERAL PURPOSE         COMPONENTS         PART V. OUTPUT =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS)
 NIPS-101700      ENERAL PURPOSE         COMPONENTS         PART VII.REMOTE INQUIRY (RIP)(UPDATE)(STRIP) =PROGRAM DESCRIPTION:NMCS INFORM
 NIPS-102300      Y SUPPORT              COMPONENTS       PART III. UTILITY SUPPORT =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYS
 NIPS-101207      ENERAL PURPOSE         COMPONENTS         PART II. FILE MAINTENANCE (FM) =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSI
 NIPS-101300      ENERAL PURPOSE         COMPONENTS         PART III.FILE MAINTENANCE PROPER DISK (FMPD) =PROGRAM DESCRIPTION: NMCS INFOR
 NIPS-102200      ITY SUPPORT            COMPONENTS       PART II. UTILITY SUPPORT =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SYS
 NIPS-101100      ENERAL PURPOSE         COMPONENTS         PART I. FILE MAINTENANCE (FM) =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSI
 NIPS-101000      ENERAL PURPOSE         COMPONENTS          =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS)IBM 1410/7010.V
 AFIC-KILL62      N FOR IBM 7090         COMPONENT)       =THE DUPLEX UNIFILE SYSTEM (GENERAL DESIGN SPECIVICATIO
 TUMS-WILL67                             COMPOSE/PRODUCE  A USER-ORIENTED REPORT GENERATOR CAPABILITY WITHIN THE SDC TIME-SHARED DATA MA
 COLI-SPIT62       RETRIEVAL AND         COMPUTATION      CONCEPT =USSTRICOM PHASE I DATA
 SC-1-KELS67       ENGINEERING A         COMPUTER-BASED   INFORMATION SYSTEM =
  GEN-WALK64      NAGEMENT  OF A         COMPUTER-CENTERED DATA BASE =PROCEEDINGS OF THE SYMPOSIUM ON DEVELOPMENT AND MA
  GEN-BUCK66                             COMPUTER-CENTERED DATA BASE SYSTEMS =
  GEN-SDCM65      D SYMPOSIUM ON         COMPUTER-CENTERED DATA BASE SYSTEMS =THE 2N
  GEN-BAUM65      D SYMPOSIUM ON         COMPUTER-CENTERED DATA BASE SYSTEMS =PROC.OF THE SECON
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NIPS-IBM108   UCTION TO FILE      CONCEPT              =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
IDS-CEIN07    A STORE: A NEW      CONCEPT              IN DATA MANAGEMENT =INTEGRATED DAT
COLI-SPII02   ND COMPUTATION      CONCEPT              =USSTRICOM PHASE I DATA RETRIEVAL A
DATA-WARR00     THE DATAPOOL      CONCEPT              A DATAPOOL SIMULATION SUBROUTINE =
SC-1-HILS08   ATA BASE - ITS      CONCEPTS             DEVELOPMENT AND USE =THE LOGICAL D
 GEN-GILE08             SOME      CONSIDERATIONS       REGARDING ARRANGEMENT OF RECORDS ON MAGNETIC TAPE =
ASO-PRYN04    M FOR MULTIPLE      CONSOLES             =AN EXECUTIVE PROGRA
 GEN-BURN03   ICAL LOGIC FOR      CONTENT               RETRIEVAL =ENGLISH-LIKE SYSTEMS OF MATHEMAT
 GEN-ROSE04     COMMAND AND       CONTROL              SYSTEM =APPLICATION OF SERIAL AND PARALLEL FILE STRUCTURES TO
ICS-IBMMXX -   - INFORMATION      CONTROL              SYSTEM =ICS
MULT-PRYN04   OR COMMAND AND      CONTROL              =THE ORGANIZATION OF FILES F
473L-BARL04   AF COMMAND AND      CONTROL              SYSTEM QUERY LANGUAGE=HEADQUARTERS,US
LUCI-SY1304   , OPERATIONAL       CONTROL              =VOLUME I, LUCID CONTROL SYSTEM DESIGN, PART 3
LUCI-SY1304   OLUME I, LUCID      CONTROL              SYSTEM DESIGN, PART 3, OPERATIONAL CONTROL =V
LUCI-SY1404   I.LUCID SYSTEM      CONTROL              DESIGN,PART 4,TEST SET-UP =VOLUME
LUCI-SY1204   I.LUCID SYSTEM      CONTROL              DESIGN,PART 2,PARAMETER LOAD =VOLUME
SPAN-SYST04   OSSARY OF SPAN      CONTROL              WORDS =SPAN REFERENCE MANUAL,GL
LUCI-SY1104   VOLUME I.LUCID      CONTROL              SYSTEM DESIGN,PART 1,THE MASTER TAPE=VOLUME
AESO-SUMM07      INFORMATION      CONTROL              SYSTEM =AESOP: A FINAL REPORT: A PROTOTYPE ON-LINE INTERACTIVE
AESO-SEMM05   R ON-LINE USER      CONTROL              OF ORGANIZATIONAL DATA STORAGE, RETRIEVAL AND PROCESSING =AESOP: A PROTOTYPE F
DEAC-CRAI08   ISH ACCESS AND      CONTROL               =DEACON: DIRECT ENGL
COLI-MITR04    COLINGO 'D' A      CONTROL              LANGUAGE FOR US STRIKE COMMAND =
CONV-KELO08                       CONVERSE             - A SYSTEM FOR THE ON-LINE DESCRIPTION AND RETRIEVAL OF STRUCTURED DATA USING
 GEN-EDPA00              THE      CORPORATE            DATA FILE =
 GEN-EDP200                       CORPORATE            DATA FILE DESIGN =
CRES-CRAI00                       CRESTS-COURTAULDS RAPID EXTRACT,SORT AND TABULATE SYSTEM =
TOMS-FRAN00   ING     USING A     CROSS-INDEX          FILE AND SELF-DEFINING ENTRIES =A DATA MANAGEMENT SYSTEM FOR TIME-SHARED FILE
IPS-NAVC08                        CSDS                 USER'S GUIDE,VOLUME 3,PART 2:'FILE MAINTENANCE SUBSYSTEM,INFORMATION RETRIEVAL
C-10-SIEI07              THE      C-10                 SYSTEM:A TALK PRESENTED AT THE 1967 SJCC =
C-10-SIEL07   COMPUTER, THE       C-10                 SYSTEM =FILE MANAGEMENT ON A SMALL
COLI-SIEI00          COLINGO      C-10                 USER'S MANUAL VOL.1: BASIC USER'S GUIDE, SERIES 3: PROFILE =
DAPL-SINO08                       DATAPLUS             - A LANGUAGE FOR REAL TIME INFORMATION RETRIEVAL FROM HIERARCHICAL DATA BASES
DATA-WARR00              THE      DATAPOOL             CONCEPT,A DATAPOOL SIMULATION SUBROUTINE =
DATA-WARR00   POOL CONCEPT,A      DATAPOOL             SIMULATION SUBROUTINE =THE DATA
 GEN-DODS05   -ART SURVEY OF      DATA-BASE            SYSTEMS =STATE-OF-THE
DEAC-CRAI04                       DEACON               BREADBOARD GRAMMAR =
DEAC-THOP04                       DEACON               BREADBOARD SUMMARY =
DEAC-CRAI00                       DEACON                DIRECT ENGLISH ACCESS AND CONTROL =
DEAC-THOM04   LEMENTATION OF      DEACON-TYPE.         SYSTEMS =THE APPLICATION AND IMP
NIPS-1B0108   10/7010 VOL.I.      DECK                 SEQUENCES AND ERROR CODES =OPERATORS MANUAL NMCS INFORMATION PROCESSING SYSTEM
 GEN-CHAP08                A      DEEPER               LOOK AT DATA =
IPS-USNA03    VOL.1-PROGRAM       DES                   VOL.2-PROGRM FLOW DIAGRAMS AND LISTINGS, VOL.4-INF.SYSTEM DESIGN AND UTILIZAT
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NIPS-1B1108          PROGRAM      DESCRIPTION           NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL.I.GENERAL PURPOSE
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NIPS-1B2108          PROGRAM      DESCRIPTION          NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010,VOL.II,GENERAL PURPOSE
NIPS-1B1207          PROGRAM      DESCRIPTION          NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL.I.'GENERAL PURPOSE
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NIPS-1B1407          PROGRAM      DESCRIPTION           NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL.I GENERAL PURPOSE
NIPS-1B1306          PROGRAM      DESCRIPTION           NMCS INFORMATION PROCESSING SYSTEM (NIPS)IBM 1410/7010,VOL.I.GENERAL PURPOSE
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NIPS-1B1900          PROGRAM      DESCRIPTION          NMCS INFORMATION PROCESSING SYSTEM (NIPS)IBM 1410/7010,VOL.I. GENERAL PURPOSE
TUFF-NAVC02                       DESCRIPTION          OF THE SUMMARY PROGRAM =
GIS-IBMXX     IS APPLICATION      DESCRIPTION          MANUAL =G
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IMS-IBMM66    N) APPLICATION     DESCRIPTION      MANUAL =INFORMATION MANAGEMENT SYSTEM/360 FOR THE IBM SYSTEM/360 (SYSTEM DESCR
GIS-IBMC65    EM APPLICATION     DESCRIPTION      =GENERALIZED INFORMATION SYST
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AIMS-AUER65                 A    DESCRIPTION      OF AIMS,AUERBACH INFORMATION MANAGEMENT SYSTEM=
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MAPS-POST05                   FILE        MANAGEMENT: GENERALIZED APPLICATION PROGRAMS =
IPS-USNA03   STEM FORMATTED   FILE        SYSTEM VOL.1-PROGRAM DES. VOL.2-PROGRM FLOW DIAGRAMS AND LISTINGS. VOL.4-INF.S
MARK-INFR09         MARK IV   FILE        MANAGEMENT SYSTEM - OPERATIONS GUIDE =
NIPS-1BA100  10/7010 VOL.I.   FILE        MAINTENANCE,STRUCTURING,AND REVISION =ANALYTICAL MANUAL NMCS INFORMATION PROCE
IDS-BACH00   D LANGUAGE FOR   FILE        ORGANIZATION AND MANIPULATION =ON A GENERALIZE
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NIPS-1BM800   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-VOL.VIII: UTILITY SUPPORT (US) =NATIONAL MILITARY COMMAN
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NIPS-1BM200   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-VOL.II: FILE STRUCTURING (FS) =NATIONAL MILITARY COMMAND
MARK-INF000         MARK IV   FILE        MANAGEMENT SYSTEM - PRACNIQUES HANDBOOK =
NIPS-1BM300  S)-VOL.III:      FILE        MAINTENANCE (FM) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYST
NIPS-1BM700   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-VOL.VII: REMOTE DEVICE (RD) =NATIONAL MILITARY COMMAND S
NIPS-1BM500   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-VOL.V(A); OUTPUT PROCESSOR (OP) =NATIONAL MILITARY COMMA
NIPS-1BM200  S)-VOL.II:       FILE        STRUCTURING (FS) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYST
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NIPS-1BM600   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-VOL.VI: SYSTEM FORMATTED OUTPUT (SFO) =NATIONAL MILITARY
MARK-INF500         MARK IV   FILE        MANAGEMENT SYSTEM - SPECIAL FEATURES MANUAL =
NIPS-1BM000   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-PROCEDURE LIBRARY OPERATORS MANUAL =NATIONAL MILITARY CO
IDMS-FRAN00  OR TIME-SHARED   FILE        PROCESSING USING A CROSS-INDEX FILE AND SELF-DEFINING ENTRIES =A DATA MANAGEME
NIPS-1BMA00   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-CAPABILITY DESIGN SPECIFICATION =NATIONAL MILITARY COMMA
NIPS-1BM100  NTRODUCTION TO   FILE        CONCEPT =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FO
NIPS-1BM100   360 FORMATTED   FILE        SYSTEM (NIPS 360 FFS)-VOL.I: INTRODUCTION TO FILE CONCEPT =NATIONAL MILITARY C
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GEN-THOM08     INFORMATION TO     MINIMIZE              SEARCH TIME THROUGH A DATA BASE =A PROPOSED STRUCTURE FOR DISPLAYED
VIP-ROSA02     D RETRIEVAL OF     MISSILE              DATA =VIP: A VARIABLE INFORMATION PROCESSING SYSTEM FOR STORAGE AN
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TUFF-WILR03     704/7090 TUFF     MOD                  III,TAPE UPDATER FOR FORMATTED FILES =USER'S MANUAL FOR
GEN-LEIM03     E ORGANIZATION     MODEL                 =A LITERATURE SEARCH AND FIL
GEN-SENN08     ION EVALUATION     MODEL                (FOREM) =A FILE ORGANIZAT
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DESI-ZIE005                 A     MODULAR              APPROACH TO BUSINESS EDP PROBLEM SOLVING =
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ASO-PRY.04     VE PROGRAM FOR     MULTIPLE             CONSOLES =AN EXECUTI
GEN-KELL08     MANAGEMENT FOR     MULTIPLE             LANGUAGE DATA BANKS =GENERALIZED INFORMATION
GEN-GHOS08     K RECORDS WITH     MULTIPLE-VALUED      ATTRIBUTES =APPLICATION OF FINITE GEOMETRY IN FILE ORGANIZATION FO
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GEN-MORE07      CHANGING TO A     MUTLILEVEL           STORAGE ORG. =APPLICATION OF LEVEL
GEN-SEVE07                THE     NATIONAL             BUREAU OF STANDARDS REPORT TO THE AGENCY FOR INTERNATION DEVELOPMENT: SELECTIO
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NIPS-IBM500                       NATIONAL             MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTE
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NIPS-IBM000                       NATIONAL             MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTE
NIPS-IBM100                       NATIONAL             MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTE
NIPS-IBM400                       NATIONAL             MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTE
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NIPS-IBM300                       NATIONAL             MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED FILE SYSTE
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IPS-IBMC03     R'S MANUAL FOR     NAVCOSSACT           INFORMATION PROCESSING SYSTEM PHASE I =USE
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NIPS-IB2108   AM DESCRIPTION:   NMCS           INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010.VOL.II,GENERAL PURPOSE COMP
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 GEN-REIL07   YSTEMS, PART 6    OFFINAL        REPORT ON MECHANIZED INFORMATION SERVICES IN THE UNIVERSITY LIBRARY =EVALUATIO
 GEN-ALLE08                     OMNIBUS         A LARGE DATA BASE MANAGEMENT SYSTEM =
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NIPS-IBI007         PART VI.  OUTPUT         =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010.V
NIPS-IBA200    RETRIEVAL AND  OUTPUT         =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL
NIPS-IBM000   STEM FORMATTED  OUTPUT         (SFO) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORM
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NIPS-IBI407    IEVAL AND SORT  PROCESSOR           (RASP) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FOR
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MULT-PRYM65    IBRARY THROUGH     REMOTE            ACCESS =BROWSING IN AN AUTOMATED L
NIPS-IBM768    S)-VOL.VII:        REMOTE            DEVICE (RD) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 36
NIPS-IBM766    .       PART VII.  REMOTE            INQUIRY (RIP)(UPDATE)(STRIP) =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING
REMS-MORR67    UMENTATION FOR     REMOTE            FILE MANAGEMENT SYSTEM =WORKING DOC
GIPS-AUDI69    CESSING SYSTEM     REMOTE             TERMINAL USERS GUIDE =GIPSY - GENERAL INFORMATION PRO
 GEN-SALT65                 THE   REPRESENTATION    OF DATA STRUCTURES IN INFORMATION SYSTEMS=
 GEN-DIMP69    URES AND THEIR     REPRESENTATION    IN STORAGE =DATA STRUCT
 GEN-JOHN61    RAND STRUCTURE,    REPRESENTATION    STORAGE AND SEARCH =ON OPE
AIDS-IBM365             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS),VOL.III,APPENDIX =
AIDS-IBM465             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS),VOL.IV,APPENDIX =
AIDS-IBM565             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS),VOL.V.APPENDIX =
AIDS-IBM163             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS),VOL.I =
AIDS-IBMA65             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS).VOLUME I.APPENDIX =
AIDS-IBMM65             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS) =
AIDS-IBM265             APPLIED   RESEARCH          PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS),VOLUME II.APPENDIX =
MASS-BARN66    EM IN HOSPITAL     RESERCH           =USE OF A TIME-SHARED GENERAL PURPOSE FILE-HANDLING SYST
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 GEN-LAND63    IN INFORMATION     RET                =THE BALANCED TREE AND ITS UTILIZATION
IPS-USNA63     ION. VOL.5-INF.    RET               =INTELLIGENCE DATA PROCESSING SYSTEM FORMATTED FILE SYSTEM VOL.1-PROGRAM DES.
 GEN-CROA63    GUAGES IN DATA     RETREIVAL         =QUERY LAN
 GEN-JONE66     A STORAGE AND     RETRIEVAL         SYSTEM =DATA FILE TWO -
 GEN-SALT66    GANIZATION AND     RETRIEVAL         =AUTOMATIC INFORMATION OR
 GEN-EDMU67    IN INFORMATION     RETRIEVAL         =ADAPTIVE MAN,MACHINE INTERACTION
 GEN-FOXA69     FOR DATA          RETRIEVAL         =IMPLEMENTATION OF A SYNTAX-DRIVEN INTERPRETER
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MULT-PRYMXX    ON STORAGE AND     RETRIEVAL          EXTENDING HUMAN MEMORY AND RECALL =INFORMATI
RELA-LEVI65    UTION AND DATA     RETRIEVAL         =RELATIONAL DATA FILE: A TOOL FOR MECHANIZED INFERENCE EXEC
BIRS-VINS67    TERIALS: I.        RETRIEVAL         OF EDUCATIONAL AND PSYCHOLOGICAL TESTS =IMPROVING THE ACCESSIBILITY OF EDUCAT
BIRS-VINS68       INFORMATION     RETRIEVAL         IN THE BEHAVIORAL SCIENCES =BIRS: A SYSTEM OF GENERAL PURPOSE COMPUTER PROGRA
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DIAL-DREW66    RARY REFERENCE     RETRIEVAL         SYSTEM =AN ON-LINE TECHNICAL LIB
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 GEN-KAUF66    AL INFORMATION     RETRIEVAL         CENTER SYSTEM TECHNIQUES AND APPLICATIONS =THE IBM TECHNIC
 GEN-HAYE66       INFORMATION     RETRIEVAL         AN INTRODUCTION =
GIRP-DATA63   ED INFORMATION    RETRIEVAL      PROGRAM FOR THE IBM 1401 COMPUTER =A GENERALIZ
 GEN-HOLT63   MATION            RETRIEVAL      =SOME THEORIZING ON MEMORY STRUCTURE AND INFOR
 GEN-EDPA64   MANAGEMENT AND    RETRIEVAL      =FILE
 GEN-DECK63   ON STORAGE AND    RETRIEVAL      TOOLS,ELEMENTS,THEORIES =INFORMATI
 GEN-LLOY64             DATA    RETRIEVAL      =
 GEN-SALT64   LE INFORMATION    RETRIEVAL      SYSTEMS USING STRUCTURE MATCHING PROCEDURES =SOME FLEXIB
 GEN-SALT62   IN INFORMATION    RETRIEVAL      =MANIPULATION OF TREES
DACE-DARN65   OQUIUM ON INF.    RETRIEVAL       =RELIABILITY CENTRAL DATA MANAGEMENT SYSTEM IN: RUBINOFF, M. (ED.). TOWARD A
 GEN-MOOR61   GE INFORMATION    RETRIEVAL      SYSTEMS =A SCREENING METHOD FOR LAR
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DIAL-SUMM68   LINE REFERENCE    RETRIEVAL      SYSTEM =DIALOG: AN OPERATIONAL ON-
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  GEN-FOSS66  OF INFORMATION    RETRIEVAL       LANGUAGE AND SYSTEMS,FINAL REPORT =OPTIMIZATION AND STANDARDIZATION
 CONV-KELO68  ON AND            RETRIEVAL      OF STRUCTURED DATA USING NATURAL LANGUAGE =CONVERSE - A SYSTEM FOR THE ON-LINE
 DAPL-SINO68  ME INFORMATION    RETRIEVAL       FROM HIERARCHICAL DATA BASES =DATAPLUS - A LANGUAGE FOR REAL TI
 XD-1-CATA63  D-1 (AN/FSQ-7)    RETRIEVAL      SYSTEM =QUERY LANGUAGE OF THE X
 DAFI-DONE66   A STORAGE AND    RETRIEVAL      SYSTEM =DATA FILE TWO -
 GRS-INFO67          GENERAL    RETRIEVAL      SYSTEM FOR MANAGERS =
 GRS-INFO67          GENERAL    RETRIEVAL      SYSTEM, GENERAL INFORMATION MANUAL =
 MULT-PRYA62  ME STORAGE AND    RETRIEVAL       =THE MULTI-LIST SYSTEM FOR REAL-TI
  GEN-BERU64  ON STORAGE AND    RETRIEVAL       A STATE-OF-THE-ART REPORT =INFORMATI
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  GEN-CURT65      OPTIMIZING    RETRIEVAL      RESULTS WITH MAN-MACHINE INTERACTION =
 VIP-ROSA62    STORAGE   AND    RETRIEVAL      OF MISSILE DATA =VIP: A VARIABLE INFORMATION PROCESSING SYSTEM FOR
  GEN-CURT67  ANIZATIONS FOR    RETRIEVAL       =MAGNETIC TAPE AND DISC FILE ORG
  GEN-DCHN63  R CONTENT         RETRIEVAL      =ENGLISH-LIKE SYSTEMS OF MATHEMATICAL LOGIC FO
 TOFF-VESP61     INFORMATION    RETRIEVAL      PROGRAM =
 NIPS-IBA268  O VOL.II. DATA    RETRIEVAL      AND OUTPUT =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 14
 INFO-OLLE66  L FOR DOCUMENT    RETRIEVAL      APPLICATIONS =USE OF INFO
 RECO-CLIM63       RECOL - A    RETRIEVAL      COMMAND LANGUAGE =
 IPS-DERA63      INFORMATION    RETRIEVAL      SYSTEM 704/7090 - USER'S MANUAL =
 RELA-LEVI67            DATA    RETRIEVAL       =A COMPUTER SYSTEM FOR INFERENCE EXECUTION AND
 NIPS-IBM468  S)-VOL.IV:        RETRIEVAL      AND SORT PROCESSOR (RASP) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCES
 PDQ-APPL67   Y) INFORMATION    RETRIEVAL      SYSTEM =THE PDQ (PROGRAM FOR DESCRIPTOR QUER
 SELE-REDAXX  HE SELECT DATA    RETRIEVAL      SYSTEM =T
 IPS-NAVC66   EM,INFORMATION    RETRIEVAL      SUBSYSTEM,LIBRARY MAINTENANCE SUBSYSTEM' =CSDS USER'S GUIDE,VOLUME 3,PART 2('F
 NIPS-IBI467  .     PART IV.    RETRIEVAL      AND SORT PROCESSOR (RASP) =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SY
 IPS-DERAXX   90 INFORMATION    RETRIEVAL      =USER'S MANUAL FOR THE 704/70
 GIRL-POST62  ED INFORMATION    RETRIEVAL      AND LISTING SYSTEM =GENERALIZ
 COLI-SMIT62  M PHASE I DATA    RETRIEVAL      AND COMPUTATION CONCEPT =USSTRICO
 GIRS-PLAS67  ED INFORMATION    RETRIEVAL      SYSTEM =GENERALIZ
 FILE-USNY63   S,INFORMATION    RETRIEVAL      =INTELLIGENCE DATA PROCESSING SYSTEM,FORMATTED FILE SYSTEM, VOLUMEN
 AESO-BENN65  .DATA STORAGE,    RETRIEVAL      AND PROCESSING =AESOP: A PROTOTYPE FOR ON-LINE USER CONTROL OF ORGANIZATIONAL
 INFO-OLLE67   STORAGE AND      RETRIEVAL      APPLICATIONS =INFOL: A GENERALIZED LANGUAGE FOR INFORMATION
 ALER-KELL66  , STORAGE, AND    RETRIEVAL      OF INFORMATION =THE FACT COMPILER, A SYSTEM FOR THE EXTRACTION
 FFS-DEFO66    FILE SYSTEM -    RETRIEVAL      AND OUTPUT MANUAL =IDHS 1410 FORMATTED
 ASC-ZIMM64   FILE INVENTORY    RETRIEVAL      SYSTEM =NAVAL AVIATION SUPPLY OF
  GEN-OLLE67  BOTH  DATA AND    RETRIEVING     INFORMATION =GENERALIZED SYSTEMS FOR STORING STRUCTURED VARIABLE-LE
 UL/1-OLLE68  L LANGUAGE FOR    RETRIEVING     INFORMATION FORM DATA BASES =UL/1: A NON-PROCEDURA
 ACSI-COLL62  PROCESSING AND    RETRIEVING     =INFORMATION STRUCTURE FOR
 NIPS-IBA168  RING,AND          REVISION       =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 VOL
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ASO-PERR65      ASO EXECUTIVE   ROUTINE        =TECHNICAL REPORT ON THE
DALE-BARN65               IN:   RUBINOFF       N. (ED.). TOWARD A NATIONAL INFORMATION SYSTEM: 2ND ANNUAL NATL. COLLOQUIUM O
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BEST-HATOXX   INFORMATION. A    SAMPLE         BEST PROGRAM =GENERAL
RELA-TONG67        A SIMPLE     SCHEME         FOR FORMALIZING DATA RETRIEVAL REQUEST =
GEN-GRUM68     RIENTED FILING   SCHEMES        USING DISCRETE MATHEMATICS =ON THE PROBLEM OF QUERY-O
MULT-PRYA61   PENN.THE MOORE    SCHOOL         OF ELECTRICAL ENGINEERING =THE MULTI-LIST SYSTEM,U.OF
BIRS-VINS66   THE BEHAVIORAL    SCIENCES       =BIRS: A SYSTEM OF GENERAL PURPOSE COMPUTER PROGRAMS FOR INFORMATION RETRIEVAL
GEN-CAST65    FOR THE SOCIAL    SCIENCES        =DATA MANAGEMENT TECHNIQUES
SCOR-AILAXX               THE   SCORE          SYSTEM =
GEN-MOOR61                  A   SCREENING      METHOD FOR LARGE INFORMATION RETRIEVAL SYSTEMS =
LUCI-SYSTXX                     SDC            DIGEST: LUCID AND TDMS DATA MANAGEMENT SYSTEMS =
TDMS-SDCXX     IZATION IN THE   SDC            TIME-SHARED DATA MANAGEMENT SYSTEM (TDMS) =FILE ORGAN
TDMS-WILL67    ITY WITHIN THE   SDC            TIME-SHARED DATA MANAGEMENT SYSTEM =COMPOSE/PRODUCE:A USER-ORIENTED REPORT GEN
TDMS-BLEI67    UCTURES IN THE   SDC            TIME-SHARED DATA MANAGEMENT SYSTEM (TDMS) =TREATING HIERARCHICAL DATA STR
MANA-SCIE66                     SDS            MANAGE REFERENCE MANUAL =
GEN-THOM68     N TO MINIMIZE    SEARCH         TIME THROUGH A DATA BASE =A PROPOSED STRUCTURE FOR DISPLAYED INFORMATIO
GEN-SHOF66    AINTENANCE AND    SEARCH         OF MACHINE FILES =ORGANIZATION, M
GEN-LEIM68      A LITERATURE    SEARCH         AND FILE ORGANIZATION MODEL =
GEN-JOHN61    ON STORAGE AND    SEARCH         =ON OPERAND STRUCTURE,REPRESENTATI
GEN-CLIM66    GANIZATION AND    SEARCH         TECHNIQUES =FILE OR
GEN-HIBB62    PPLICATIONS TO    SEARCHING      AND SORTING =SOME COMBINATIONAL PROPERTIES OF CERTAIN TREES WITH A
GEN-DELA59               FILE   SEARCHING      USING VARIABLE LENGTH KEY =
GEN-JOHS61     ADDRESSING OF    SECONDARY      KEYS =AN INDIRECT CHAINING METHOD FOR
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GEN-SEVE67    N DEVELOPMENT:    SELECTION      OF A SOFTWARE SYSTEM FOR AID'S INFORMATION PROCESSING =THE NATIONAL BUREAU OF
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TDMS-FRAN66   INDEX FILE AND    SELF-DEFINING  ENTRIES =A DATA MANAGEMENT SYSTEM FOR TIME-SHARED FILE PROCESSING USING A CROS
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GEN-MCCA65                 ON   SERIAL         FILES WITH RELOCATABLE RECORDS =
GEN-ROSE64    APPLICATION OF    SERIAL         AND PARALLEL FILE STRUCTURES TO COMMAND AND CONTROL SYSTEM =APPLIC
COLI-STIE66    USER'S GUIDE,    SERIES         3: PROFILE =COLINGO C-10 USER'S MANUAL VOL.1: BASIC
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IDS-GENR67             GE 400   SERIES         IDS/COBOL =
IDS-GENE67             GE 200   SERIES         INTEGRATED DATA STORE =
GEN-REIL67    ED INFORMATION    SERVICES       IN THE UNIVERSITY LIBRARY =EVALUATION OF GENERALIZED FILE MANAGEMENT SYSTEMS.
LUCI-STI464   GN,PART,4.TEST    SET-UP         =VOLUME I.LUCID SYSTEM CONTROL DESI
RELA-TONG67                 A   SIMPLE         SCHEME FOR FORMALIZING DATA RETRIEVAL REQUEST =
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SPAN-FRAN66   ATIVE  AND FOR    SOCIOECONOMIC  PLANNING AND ANALYSIS: SPAN AND TDMS COMPARED =GENERAL PURPOSE DATA MANAGEMENT
TDMS-FRAN66   ATIVE  AND FOR    SOCIOECONOMIC  PLANNING AND ANALYSIS: SPAN AND TDMS COMPARED =GENERAL PURPOSE DATA MANAGEMENT
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GEN-ECPA65    ILE PROCESSING    SOFTWARE       =GENERALIZED F
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MULT-PRYA61   MPUTER PROBLEM    SOLVING        WITH MULTI-LIST =MAN CO
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BEST-21EG05   SS EDP PROBLEM   SOLVING             =A MODULAR APPROACH TO BUSINE
NIPS-1B1407   .RETRIEVAL AND   SORT                PROCESSOR (RASP) =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SYSTEM (NIP
NIPS-1BM408    RETRIEVAL AND   SORT                PROCESSOR (RASP) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYST
CRES-CRA100   RAPID EXTRACT,   SORT                AND TABULATE SYSTEM =CRESTS-COURTAULDS
GEN-H13802     SEARCHING AND   SORTING             =SOME COMBINATIONAL PROPERTIES OF CERTAIN TREES WITH APPLICATIONS TO
SPAN-FRAN00    AND ANALYSIS:   SPAN                AND TDMS COMPARED =GENERAL PURPOSE DATA MANAGEMENT SYSTEMS FOR ADMINISTRATIVE
SPAN-ALME05                    SPAN                REFERENCE MANUAL: SPAN-DATA-TRANSFORMATIONS AND STRATIFICATION CAPABILITY =
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SPAN-SYS205                    SPAN                REFERENCE MANUAL. DATA FILES MANIPULATION AND PROCESSING =
SPAN-SYS105   ERENCE MANUAL.   SPAN                SYSTEM OPERATION =SPAN REF
SPAN-SYS105                    SPAN                REFERENCE MANUAL. SPAN SYSTEM OPERATION =
SPAN-SYS104                    SPAN                REFERENCE MANUAL,GLOSSARY OF SPAN CONTROL WORDS =
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MARK-INF500   EMENT SYSTEM -   SPECIAL             FEATURES MANUAL =MARK IV FILE MANAG
GEN-POS104                     SPECIALIZED         COMPUTER PROGRAMS AID PLANNING =
473L-1BMC04      OPERATIONAL   SPECIFICATION       FOR QUERY LANGUAGE-473L =
473L-1BMC02     OTC-A CODING   SPECIFICATION       VOLUME 2 =
TUFF-VESP00      FILE FORMAT   SPECIFICATION       =
NIPS-1BMA08   BILITY  DESIGN   SPECIFICATION       =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
DM-1-SAB100    VOL I: DESIGN   SPECIFICATION       REPORT =RELIABILITY CENTRAL AUTOMATIC DATA PROCESSING SUBSYSTEM.
DM-1-SAB200    VOLII: DESIGN   SPECIFICATION       REPORT =RELIABILITY CENTRAL AUTOMATIC DATA PROCESSING SUBSYSTEM.
LUCI-FRAN02    SYSTEM DESIGN   SPECIFICATIONS      =THE LUCID SYSTEM OF AUTOMATIC PROGRAMMING DIRECTLY FROM DATA PROCESSING
TDMS-SDC1XX    - LANGUAGE      SPECIFICATIONS      =THE TIME-SHARED DATA MANAGEMENT SYSTEM (TDMS)
LUCI-FRA104    SYSTEM DESIGN   SPECIFICATIONS      FOR LUCID PHASE I =
AFIC-RI1102   GENERAL DESIGN   SPECIVICATION       FOR IBM 7090 COMPONENT) =THE DUPLEX UNIFILE SYSTEM (
GEN-FOSS00    TIMIZATION AND   STANDARDIZATION     OF INFORMATION RETRIEVAL LANGUAGE AND SYSTEMS,FINAL REPORT =OP
GEN-LAND09    BILITY,    AND   STANDARDIZATION      =CLASSIFIED BIBLIOGRAPHY ON BIBLIOGRAPHIC, COMPATI
GEN-LAND09   PATIBILITY AND    STANDARDIZATION     =CLASSIFIED BIBLIOGRAPHY ON BIBLIOGRAPHIC DATA BASE INTERACTION, COM
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GEN-BERG04   D RETRIEVAL: A    STATE-OF-THE-ART    REPORT =INFORMATION STORAGE AN
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TUFF-NAVA03   AGES AND ERROR   STOPS               =704/7090 TUFF (TAPE UPDATER FOR FORMATTED FILES),ON-LINE MESS
GEN-JONE08    A FILE TWO - A   STORAGE             AND RETRIEVAL SYSTEM =DAT
MULT-PRYNXX      INFORMATION   STORAGE             AND RETRIEVAL: EXTENDING HUMAN MEMORY AND RECALL =
GEN-PATR04     ADAPTING MASS   STORAGE             EQUIPMENT FOR THE HANDLING OF A DATA BASE =
GEN-BERG04       INFORMATION   STORAGE             AND RETRIEVAL: A STATE-OF-THE-ART REPORT =
APL-KENN05    ERS TO THE APL   STORAGE             AND RETRIEVAL SYSTEM =THE APPLICATION OF COMPUT
GEN-DALE05     FOR SECONDARY   STORAGE              =A GENERAL PURPOSE FILE SYSTEM
GEN-OPLE05    RARCHICAL        STORAGE              =DYNAMIC FLOW OF PROGRAMS AND DATA THROUGH HIE
GEN-JOHN01    REPRESENTATION   STORAGE             AND SEARCH =ON OPERAND STRUCTURE,
GEN-BECK03       INFORMATION   STORAGE             AND RETRIEVAL:TOOLS,ELEMENTS,THEORIES =
MULT-PRYN02    FOR REAL-TIME   STORAGE             AND RETRIEVAL =THE MULTI-LIST SYSTEM
GEN-JIMP09    RESENTATION IN   STORAGE              =DATA STRUCTURES AND THEIR REP
GEN-LARS00    TO INFORMATION   STORAGE             AND RETRIEVAL APPLICATIONS =DATA FILTERING APPLIED
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ALER-KELL00   HE EXTRACTION,   STORAGE              AND RETRIEVAL OF INFORMATION =THE FACT COMPILER, A SYSTEM FOR T
AESO-BENN05   IZATIONAL DATA   STORAGE              RETRIEVAL AND PROCESSING =AESOP: A PROTOTYPE FOR ON-LINE USER CONTROL OF ORGA
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IDS-GENE08    NTEGRATED DATA   STORE               (GECOS III) =GE 625/635 I
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IDS-BACH67    NTEGRATED DATA    STORE          DATA BASE STUDY =I
 GEN-ZIEM68          AN ITEM    STORE&         ITS DESIGN AND IMPLEMENTATION =
 GEN-OLLE67   ED SYSTEMS FOR    STORING        STRUCTURED VARIABLE-LENGTH DATA AND RETRIEVING INFORMATION =GENERALIZ
 GEN-LEFK63        AUTOMATIC    STRATIFICATION OF INFORMATION =
SPAN-ALME65   ONS AND           STRATIFICATION CAPABILITY =SPAN REFERENCE MANUAL: SPAN-DATA-TRANSFORMATI
COLI-MITR64   ANGUAGE FOR US.   STRIKE         COMMAND =COLINGO 'D' A CONTROL L
 GEN-EVAN68             DATA    STRUCTURE      PROGRAMMING SYSTEM =
 GEN-SALT64    SYSTEMS USING    STRUCTURE      MATCHING PROCEDURES =SOME FLEXIBLE INFORMATION RETRIEVAL
 GEN-THOM68       A PROPOSED    STRUCTURE      FOR DISPLAYED INFORMATION TO MINIMIZE SEARCH TIME THROUGH A DATA BASE =
 GEN-HOLT63   ZING ON MEMORY    STRUCTURE      AND INFORMATION RETRIEVAL =SOME THEORI
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 GEN-JOHN61       ON OPERAND    STRUCTURE      REPRESENTATION STORAGE AND SEARCH =
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 GEN-OLLE67   MS FOR STORING    STRUCTURED     VARIABLE-LENGTH DATA AND RETRIEVING INFORMATION =GENERALIZED SYSTE
CONV-KELL66     RETRIEVAL OF    STRUCTURED     DATA USING NATURAL LANGUAGE =CONVERSE - A SYSTEM FOR THE ON-LINE DESCRIPTION A
 GEN-SALT65   TATION OF DATA    STRUCTURES     IN INFORMATION SYSTEMS=THE REPRESEN
 GEN-ROSE64    PARALLEL FILE    STRUCTURES     TO COMMAND AND CONTROL SYSTEM =APPLICATION OF SERIAL AND
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 GEN-LEFK69             FILE    STRUCTURES     FOR ON-LINE SYSTEMS =
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NIPS-IBM168   LE,MAINTENANCE,   STRUCTURING    AND REVISION =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM
NIPS-IBM268   L.II:     FILE    STRUCTURING    (FS) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMA
DATA-WARR66   OOL SIMULATION    SUBROUTINE     =THE DATAPOOL CONCEPT.A DATAP
 IPS-NAVC68   LNANCE            SUBSYSTEM      INFORMATION RETRIEVAL SUBSYSTEM,LIBRARY MAINTENANCE SUBSYSTEM' =CSDS USER'S GU
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DM-1-SAB200   ATA PROCESSING    SUBSYSTEM       VOLII: DESIGN SPECIFICATION REPORT =RELIABILITY CENTRAL AUTOMATIC D
DM-1-SADL65   ATA MANAGEMENT    SUBSYSTEM       FINAL REPORT =DESIGN OF RELIABILITY CENTRAL D
 IPS-NAVC68      MAINTENANCE    SUBSYSTEM'     =CSDS USER'S GUIDE,VOLUME 3,PART 2:'FILE MAINTENANCE SUBSYSTEM,INFORMATION RET
  GEN-MCGE69  IZATION:KEY TO    SUCCESSFUL     ELECTRONIC DATA PROCESSING=GENERAL
  GEN-STRA69  EMS: A CURRENT    SUMMARY        =FILE MANAGEMENT SYST
 TUFF-NAVC62  RIPTION OF THE    SUMMARY        PROGRAM =DESC
 GIM1-TRWA68   GIM-IM SYSTEM    SUMMARY        =
 DEAC-THOP64  CON BREADBOARD    SUMMARY         =DEA
  IPS-IBMC64                    SUPPLEMENT     1 TO USER'S MANUAL FOR NAVCOSSACT INFORMATION PROCESSING SYSTEM - PHASE I =
  ASU-ZIMM64  NAVAL AVIATION    SUPPLY         OFFICE INVENTORY RETRIEVAL SYSTEM =NAVAL
 SURF-WALL66                    SURF            SUPPORT OF USER RECORDS AND FILES, DESCRIPTION AND OPERATION =
 SURF-WALL66  SER'S GUIDE TO    SURF            SUPPORT OF USER RECORDS AND FILES, DESCRIPTION AND OPERATION =A U
 ASSS-COMP67  IDE TO THE SEA    SURVEILLANCE    MULTI-PROGRAMMING EXECUTIVE SYSTEM =PROGRAMMER'S AND USER'S GU
 ASSS-NAVO67    ATLANTIC SEA    SURVEILLANCE   SYSTEM =
 ASSS-COMP64   AUTOMATED SEA    SURVEILLANCE   SYSTEM =AN
 ASSS-NAVC67    ATLANTIC SEA    SURVEILLANCE   SYSTEM =
   GEN-ALLE66              A    SURVEY         OF FIVE ON-LINE RETRIEVAL SYSTEMS =
   GEN-FRYD65              K    SURVEY         OF NINE DATA MANAGEMENT SYSTEMS =
   GEN-DUBO65 ATE-OF-THE-ART    SURVEY         OF DATA-BASE SYSTEMS =ST
   GEN-FRYD67              K    SURVEY         OF FIVE DATA MANAGEMENT SYSTEMS =
   GEN-FRYD68                   SURVEY         OF MANAGEMENT INFORMATION SYSTEMS AND THEIR LANGUAGES=
   GEN-FRYD69 AGEMENT SYSTEM    SURVEY         =DATA MAN
   GEN-AIRF65 EVELOPMENTS: A    SURVEY         =ADVANCED PROGRAMMING D
  GEN-CODA69                 A  SURVEY             OF GENERALIZED DATA BASE MANAGEMENT SYSTEMS =
DM-1-SAB366   AGEMENT SYSTEM    SURVEY             =RELIABILITY CENTRAL AUTOMATIC DATA PROCESSING SUBSYSTEM, VOL III:- DATA MAN
  GEN-BAUM65  .OF THE SECOND    SYMPOSIUM          ON COMPUTER-CENTERED DATA BASE SYSTEMS =PROC
  GEN-SDCM65         THE 2ND    SYMPOSIUM          ON COMPUTER-CENTERED DATA BASE SYSTEMS =
  GEN-HEAD65       DATA BASE    SYMPOSIUM          =
  GEN-WALK64  EEDINGS OF THE    SYMPOSIUM          ON DEVELOPMENT AND MANAGEMENT OF A COMPUTER-CENTERED DATA BASE =PROC
ADAM-LIAN66                A    SYNTATIC           LANGUAGE AS A TOOL FOR SIMULATION =
DM-1-RESH66       INSCAN: A     SYNTAX-DIRECTED    LANGUAGE PROCESSOR =
  GEN-FOXM69  MENTATION OF A    SYNTAX-DRIVEN      INTERPRETER FOR DATA RETRIEVAL =IMPLE
  GEN-DOUK67  OF GENERALIZED    SYSTEMS)           =A METHODOLOGY FOR COMPARISON OF GENERALIZED DATA MANAGEMENT SYSTEMS: PEGS (PA
 SAC-JACK62   SE II SAC/AIDS    SYSTEM)            =COLLECTED DATA ON THE PROGRAM SYSTEM DESIGN (REFERS TO THE PHA
 GIS-IBMA67              IBM    SYSTEM/360         DOCUMENT PROCESSING SYSTEM:APPLICATION DESCRIPTION =
 MIS-SEMP68              IBM    SYSTEM/360         MANAGEMENT INFORMATION SYSTEM (MIS) =
 IMS-IBMM68   60 FOR THE IBM    SYSTEM/360          (SYSTEM DESCRIPTION) APPLICATION DESCRIPTION MANUAL =INFORMATION MANAGEMENT S
 IMS-IBMM68   ION MANAGEMENT    SYSTEM/360         FOR THE IBM SYSTEM/360 (SYSTEM DESCRIPTION) APPLICATION DESCRIPTION MANUAL =IN
 TUFF-IBMC62  R TUG - FORMAT    TABLE              TAPE UPDATER AND GENERATOR =USER'S MANUAL FO
 CRES-CRAI65  TRACT,SORT AND    TABULATE           SYSTEM =CRESTS-COURTAULDS RAPID EX
 C-10-STEI67   C-10 SYSTEM:A    TALK               PRESENTED AT THE 1967 SJCC =THE
 LUCI-SYSTXX  EST: LUCID AND    TDMS               DATA MANAGEMENT SYSTEMS =SDC DIG
 SPAN-FRAN66  YSIS: SPAN AND    TDMS                COMPARED =GENERAL PURPOSE DATA MANAGEMENT SYSTEMS FOR ADMINISTRATIVE AND FOR
 TDMS-FRAN66  YSIS: SPAN AND    TDMS                COMPARED =GENERAL PURPOSE DATA MANAGEMENT SYSTEMS FOR ADMINISTRATIVE AND FOR
 TDMS-VORH67                    TDMS                A NEW APPROACH TO DATA MANAGEMENT =
 DIAL-DREW66     AN ON-LINE     TECHNICAL          LIBRARY REFERENCE RETRIEVAL SYSTEM =
  GEN-KAUF66        THE IBM     TECHNICAL          INFORMATION RETRIEVAL CENTER SYSTEM TECHNIQUES AND APPLICATIONS =
 473L-IBMC63                    TECHNICAL          MEMO FOR IOC OPTIMIZATION 473L IOC PHASE =
 ASO-PERK63                     TECHNICAL          REPORT ON THE ASO EXECUTIVE ROUTINE =
  GEN-SHOF62              A     TECHNIQUE          FOR ORGANIZING LARGE FILES =
  GEN-SENK67  E ORGANIZATION    TECHNIQUES         =FORMATTED FIL
  GEN-CLIM66  ION AND SEARCH    TECHNIQUES          =FILE ORGANIZAT
  GEN-KAUF66  R SYSTEM          TECHNIQUES         AND APPLICATIONS =THE IBM TECHNICAL INFORMATION RETRIEVAL CENTE
  GEN-CAST65  ATA MANAGEMENT    TECHNIQUES         FOR THE SOCIAL SCIENCES =D
  GEN-DAVI65  SYSTEM DESIGN     TECHNIQUES          =CLASSIFICATION AND EVALUATION OF INFORMATION
  GEN-PIET66  ILE-MANAGEMENT    TECHNIQUES         AND SYSTEMS WITH APPLICATIONS TO INFORMATION RETRIEVAL, A SELECTIVE BIBLIOGRAP
 MASS-BULL66  ATION INDEXING    TECHNIQUES         IN A REAL-TIME HOSPITAL COMPUTER SYSTEM =SOME INFORM
 FFS-IBMM62       FFS QUERY     TECHNIQUES         =
 BEST-NATIXX  SS EDP SYSTEMS    TECHNIQUE)          A MAJOR BREAKTHROUGH IN COMPUTER PROGRAMMING =BEST(BUSINE
 SPAN-ALME66  THRESHOLD OF A    TECHNOLOGY         =URBAN AND REGIONAL INFORMATION SYSTEMS: ON THE
 GIPS-ADDI69   REMOTE           TERMINAL           USERS GUIDE =GIPSY - GENERAL INFORMATION PROCESSING SYSTEM
 LUCI-SYTH64   DESIGN,PART 4.   TEST               SET-UP =VOLUME I,LUCID SYSTEM CONTROL
 BIRS-VINS67   PSYCHOLOGICAL    TESTS              =IMPROVING THE ACCESSIBILITY OF EDUCATIONAL MATERIALS: 1, RETRIEVAL OF EDUCATI
  GEN-BLCK63  TOOLS,ELEMENTS,   THEORIES           =INFORMATION STORAGE AND RETRIEVAL:
  GEN-HOLT65            SOME    THEORIZING         ON MEMORY STRUCTURE AND INFORMATION RETRIEVAL =
  GEN-HOLT65  CT, VOL. 1 MEM    THEORY              =INFORMATION SYSTEM THEORY PROJE
  GEN-HOLT65  RMATION SYSTEM    THEORY             PROJECT, VOL. 1 MEM THEORY =INFO
 SPAN-ALME66  YSTEMS: ON THE    THRESHOLD          OF A TECHNOLOGY =URBAN AND REGIONAL INFORMATION S
 TDMS-SDCXX   ION IN THE SDC    TIME-SHARED        DATA MANAGEMENT SYSTEM (TDMS) =FILE ORGANIZAT
 TDMS-SDC1XX             THE    TIME-SHARED        DATA MANAGEMENT SYSTEM (TDMS) - LANGUAGE SPECIFICATIONS =
 TDMS-SDC2XX             THE    TIME-SHARED        DATA MANAGEMENT SYSTEM INTERIM USER'S GUIDE=
 MASS-BARN66        USE OF A    TIME-SHARED        GENERAL PURPOSE FILE-HANDLING SYSTEM IN HOSPITAL RESERCH =
 TDMS-BLEI67  RES IN THE SDC    TIME-SHARED        DATA MANAGEMENT SYSTEM (TDMS) =TREATING HIERARCHICAL DATA STRUCTU
 TDMS-VORH67             THE    TIME-SHARED        DATA MANAGEMENT SYSTEM: A NEW APPROACH TO DATA MANAGEMENT =
 TDMS-FRAN66  ENT SYSTEM FOR    TIME-SHARED        FILE PROCESSING USING A CROSS-INDEX FILE AND SELF-DEFINING ENTRIES =A DATA MAN
 TDMS-WILL67  WITHIN THE SDC    TIME-SHARED        DATA MANAGEMENT SYSTEM =COMPOSE/PRODUCE:A USER-ORIENTED REPORT GENERATOR CAPAB
 DM-1-ROSE67  T SYSTEM FOR A    TIME-SHARING        ENVIRONMENT =DATA MANAGER-1: DATA MANAGEMEN
 RELA-LEVI65  L DATA FILE: A    TOOL               FOR MECHANIZED INFERENCE EXECUTION AND DATA RETRIEVAL =RELATIONA
 ADAM-LIAN66   LANGUAGE AS A    TOOL               FOR SIMULATION =A SYNTATIC
  GEN-BLCK63   AND RETRIEVAL:   TOOLS              ELEMENTS,THEORIES =INFORMATION STORAGE
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DACE-BARN65   UFF, M. (ED.).   TOWARD           A NATIONAL INFORMATION SYSTEM: 2ND ANNUAL NATL. COLLOQUIUM ON INF. RETRIEVAL =
CONV-KELL66          ON-LINE   TRANSLATION      OF NATURAL LANGUAGE QUESTIONS INTO ARTIFICIAL LANGUAGE QUERIES =
LUCI-SY4164   OLUME IV.LUCID   TRANSLATOR       DESIGN =V
473L-TERR62   M EXPERIMENTAL   TRANSPORTATION    PLANNING FACILITY PROGRAM =7090 FILE GENERATION SYSTE
TDMS-BLEI67                    TREATING         HIERARCHICAL DATA STRUCTURES IN THE SDC TIME-SHARED DATA MANAGEMENT SYSTEM (TD
GEN-LAND63      THE BALANCED   TREE             AND ITS UTILIZATION IN INFORMATION RET. =
GEN-SUSS62        THE USE OF   TREE             STRUCTURES FOR PROCESSING FILES =
GEN-HIBB62    IES OF CERTAIN   TREES            WITH APPLICATIONS TO SEARCHING AND SORTING =SOME COMBINATIONAL PROPERT
GEN-SALT62    ANIPULATION OF   TREES            IN INFORMATION RETRIEVAL =M
TUFF-WILK63   L FOR 704/7090   TUFF             MOD III,TAPE UPDATER FOR FORMATTED FILES =USER'S MANUA
TUFF-NAVA63         704/7090   TUFF             (TAPE UPDATER FOR FORMATTED FILES),ON-LINE MESSAGES AND ERROR STOPS =
TUFF-IBMC62   R'S MANUAL FOR   TUG              - FORMAT TABLE TAPE UPDATER AND GENERATOR =USE
GEN-MINK69    NT SYSTEMS - A   TUTORIAL          =GENERALIZED DATA MANAGEME
GEN-OO3R67    T SYSTEM USING   TWO-LEVEL        STORAGE =STRUCTURE OF A LIS
MULI-PRYA62   THE MULTI-LIST   TYPE             ASSOCIATIVE MEMORY =THE MU
UL/1-ULLE68                    UL/1              A USER LANGUAGE ALSO FOR DOCUMENT APPLICATIONS =
UL/1-ULLE68                    UL/1              A NON-PROCEDURAL LANGUAGE FOR RETRIEVING INFORMATION FORM DATA BASES =
AFIC-RI1162       THE DUPLEX   UNIFILE          SYSTEM (A DETAILFD DESCRIPTION) =
AFIC-RI1162       THE DUPLEX   UNIFILE          SYSTEM (GENERAL DESIGN SPECIVICATION FOR IBM 7090 COMPONENT) =
GEN-REIL67    ES IN THE        UNIVERSITY       LIBRARY =EVALUATION OF GENERALIZED FILE MANAGEMENT SYSTEMS, PART 6 OFFINAL REP
TUFF-IBMC62   MAT TABLE TAPE   UPDATER          AND GENERATOR =USER'S MANUAL FOR TUG - FOR
TUFF-WILK63   F MOD III,TAPE   UPDATER          FOR FORMATTED FILES =USER'S MANUAL FOR 704/7090 TUF
TUFF-NAVA63   090 TUFF (TAPE   UPDATER          FOR FORMATTED FILES),ON-LINE MESSAGES AND ERROR STOPS =704/7
FFS-IBMM62    DIFICATION AND   UPDATING         =FFS MO
GEN-POST65      INFORMATICS'   URBAN            MANAGEMENT DATA SYSTEM =
SPAN-ALME66                    URBAN            AND REGIONAL INFORMATION SYSTEMS: ON THE THRESHOLD OF A TECHNOLOGY =
473L-BARL64    HEADQUARTERS,   USAF             COMMAND AND CONTROL SYSTEM QUERY LANGUAGE=
GEN-LOWE65    CTERISTICS AND   USAGE            ON DIRECT ACCESS FILE ORGANIZATION =THE INFLUENCE OF DATA BASE CHARA
DOCU-CORB66   ENTED COMPUTER   USAGE            SYSTEM =DISPLAY ORI
TUFF-VESPAX     CINCPAC EDPS   USER             MANUAL, VOL.1 =
UL/1-ULLE68          UL/1: A   USER             LANGUAGE ALSO FOR DOCUMENT APPLICATIONS =
AESO-BENN65   PE FOR ON-LINE   USER             CONTROL OF ORGANIZATIONAL DATA STORAGE, RETRIEVAL AND PROCESSING =AESOP: A PRO
SURF-WALL66   RF: SUPPORT OF   USER             RECORDS AND FILES, DESCRIPTION AND OPERATION =SU
SURF-WALL66   RF: SUPPORT OF   USER             RECORDS AND FILES, DESCRIPTION AND OPERATION =A USER'S GUIDE TO SU
QWIC-CO1566      QUICK QUERY   USERS            MANUAL =
GIPS-ADD169         TERMINAL   USERS            GUIDE =GIPSY - GENERAL INFORMATION PROCESSING SYSTEM REMOTE
GIM1-TRAC68           GIM-IM   USERS            MANUAL =
IMRA-UNIVXX   US PRELIMINARY   USERS'           MANUAL =IMRA
MADA-CRON65          MADAM:A   USER-ORIENTED    INFORMATION PROCESSING SYSTEM FOR THE IBM 1401 =
TDMS-WILL67   POSE/PRODUCE:A   USER-ORIENTED    REPORT GENERATOR CAPABILITY WITHIN THE SDC TIME-SHARED DATA MANAGEMENT SYSTEM
COLI-RO3E64                    USSTRICOM        COLINGO 'D' SYSTEM DESCRIPTION =
COLI-SPI262                    USSTRICOM        PHASE 1 QUERY LANGUAGE (COLINGO) =
COLI-SPI162                    USSTRICOM        PHASE I DATA RETRIEVAL AND COMPUTATION CONCEPT =
NIPS-102266   II.GENERAL AND   UTILITY          SUPPORT COMPONENTS.PART II. UTILITY SUPPORT =PROGRAM DESCRIPTION: NMCS INFORMA
NIPS-102266   NENTS.PART II.   UTILITY          SUPPORT =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 14
NIPS-102366   II GENERAL AND   UTILITY          SUPPORT COMPONENTS.PART III. UTILITY SUPPORT =PROGRAM DESCRIPTION:NMCS INFORMA
LUCI-ST5164   VOLUME V.LUCID   UTILITY          =VOLUME
NIPS-104366   I. GENERAL AND   UTILITY          FUNCTIONS =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 141
NIPS-102368   ENTS.PART III.   UTILITY          SUPPORT =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS)IBM 1410
NIPS-104066     S)-VOL.VIII:   UTILITY          SUPPORT (US) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 3
GEN-LAND63    D TREE AND ITS   UTILIZATION      IN INFORMATION RET. =THE BALANCE
IPS-USAR63    TEM DESIGN AND   UTILIZATION       VOL.5-INF.RET.=INTELLIGENCE DATA PROCESSING SYSTEM FORMATTED FILE SYSTEM VOL.
FILE-USAR63   TEM DESIGN AND   UTILIZATION      =INTELLIGENCE DATA PROCESSING SYSTEM,FORMATTED FILE SYSTEM, VOLUME 4, INFORMAT
GEN-DELA59    EARCHING USING   VARIABLE         LENGTH KEY =FILE S
VIP-ROSA62            VIP: A   VARIABLE         INFORMATION PROCESSING SYSTEM FOR STORAGE AND RETRIEVAL OF MISSILE DATA =
GEN-ULLE67    ING STRUCTURED   VARIABLE-LENGTH   DATA AND RETRIEVING INFORMATION =GENERALIZED SYSTEMS FOR STOR
MASS-BARD65            JOINT   VENTURE          AT MASSACHUSETTS GENERAL =
NIPS-IB1607   NT.      . PART    VI        OUTPUT =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 141
NIPS-IBM608   S 360 FFS)-VOL.    VI        SYSTEM FORMATTED OUTPUT (SFO) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION P
NIPS-IB1708   ENTS.      PART    VII       REMOTE INQUIRY (RIP)(UPDATE)(STRIP) =PROGRAM DESCRIPTION:NMCS INFORMATION PROC
NIPS-IBM708   S 360 FFS)-VOL.    VII       REMOTE DEVICE (PD) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING S
NIPS-IBM808   S 360 FFS)-VOL.    VIII      UTILITY SUPPORT (US) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING
VIP-ROSA02                       VIP       A VARIABLE INFORMATION PROCESSING SYSTEM FOR STORAGE AND RETRIEVAL OF MISSILE
GEN-HOLT05    HEORY PROJECT.     VOL       1 MEM THEORY =INFORMATION SYSTEM T
NIPS-IB0108    IBM 1410/7010     VOL       I. DECK SEQUENCES AND ERROR CODES =OPERATORS MANUAL NMCS INFORMATION PROCESSIN
NIPS-IB1708    IBM 1410/7010.    VOL       I. GENERAL PURPOSE COMPONENTS. PART VII.REMOTE INQUIRY (RIP)(UPDATE)(STRIP) =P
NIPS-IBA308    IBM 1410/7010     VOL       III. GENERAL AND UTILITY FUNCTIONS =ANALYTICAL MANUAL NMCS INFORMATION PROCESS
NIPS-IB1607    IBM 1410/7010.    VOL       I.GENERAL PURPOSE COMPONENT. PART VI. OUTPUT =PROGRAM DESCRIPTION:NMCS INFORMA
TUFF-VESPXX   S USER MANUAL.     VOL       1 =CINCPAC EDP
NIPS-IB1108    IBM 1410/7010     VOL       I.GENERAL PURPOSE COMPONENTS. PART I. FILE MAINTENANCE (FM) =PROGRAM DESCRIPTI
NIPS-IBA208    IBM 1410/7010     VOL       II. DATA RETRIEVAL AND OUTPUT =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING S
NIPS-IB2108    IBM 1410/7010.    VOL       II.GENERAL PURPOSE COMPONENT. PART I. GENERAL SUPPORT =PROGRAM DESCRIPTION:NMC
NIPS-IB1507    IBM 1410/7010.    VOL       I. GENERAL PURPOSE COMPONENTS PART V. OUTPUT =PROGRAM DESCRIPTION:NMCS INFORMA
NIPS-IB1407    IBM 1410/7010     VOL       I GENERAL PURPOSE COMPONENTS. PART IV.RETRIEVAL AND SORT PROCESSOR (RASP) =PRO
NIPS-IBM208    IBM 1410/7010     VOL       II.OPERATING INSTRUCTIONS =OPERATORS MANUAL NMCS INFORMATION PROCESSING SYSTEM
IPS-USNA03     AND LISTINGS.   . VOL       4-INF.SYSTEM DESIGN AND UTILIZATION. VOL.5-INF.RET.=INTELLIGENCE DATA PROCESSI
NIPS-IB2308   )IBM 1410/7010.    VOL       II GENERAL AND UTILITY SUPPORT COMPONENTS.PART III. UTILITY SUPPORT =PROGRAM D
IPS-USNA03    D UTILIZATION.     VOL       5-INF.RET.=INTELLIGENCE DATA PROCESSING SYSTEM FORMATTED FILE SYSTEM VOL.1-PRO
NIPS-IBA408    IBM 1410/7010     VOL       IV. ERROR PROCEDURES =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYSTEM (NI
NIPS-IB1207    IBM 1410/7010     VOL       I. GENERAL PURPOSE COMPONENTS PART II. FILE MAINTENANCE (FM) =PROGRAM DESCRIPT
NIPS-IBP308    IBM 1410/7010     VOL       III SYSTEM ALTERATIONS =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM
NIPS-IBA108    IBM 1410/7010     VOL       I. FILE,MAINTENANCE,STRUCTURING,AND REVISION =ANALYTICAL MANUAL NMCS INFORMATI
NIPS-IB1008   )IBM 1410/7010.    VOL       I. GENERAL PURPOSE COMPONENTS. =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSIN
IPS-USNA03    1-PROGRAM DES.     VOL       2-PROGRM FLOW DIAGRAMS AND LISTINGS. VOL.4-INF.SYSTEM DESIGN AND UTILIZATION.
IPS-USNA03    UFILE SYSTEM       VOL       1-PROGRAM DES. VOL.2-PROGRM FLOW DIAGRAMS AND LISTINGS. VOL.4-INF.SYSTEM DESIG
NIPS-IB1308   )IBM 1410/7010.    VOL       I.GENERAL PURPOSE COMPONENTS. PART III.FILE MAINTENANCE PROPER DISK (FMPD) =PR
NIPS-IB2208    IBM 1410/7010     VOL       II.GENERAL AND UTILITY SUPPORT COMPONENTS.PART II. UTILITY SUPPORT =PROGRAM DE
BASE-WOLF03   STION-ANSWERER,    VOL       I =THE BASEBALL PROGRAM: AN AUTOMATIC QUE
COLI-STE100    USER'S MANUAL     VOL       1: BASIC USER'S GUIDE, SERIES 3: PROFILE =COLINGO C-10
DM-1-SA8100    SUBSYSTEM.        VOL       1: DESIGN SPECIFICATION REPORT =RELIABILITY CENTRAL AUTOMATIC DATA PROCESSING
AIDS-IBM103    SYSTEM (AIDS),    VOL       I =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA
DM-1-SA8300   ING SUBSYSTEM.     VOL       III: DATA MANAGEMENT SYSTEM SURVEY =RELIABILITY CENTRAL AUTOMATIC DATA PROCESS
AIDS-IBM505    SYSTEM (AIDS),    VOL       V.APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA
AIDS-IBM405    SYSTEM (AIDS),    VOL       IV.APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA
AIDS-IBM305    SYSTEM (AIDS),    VOL       III,APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA
DM-1-SA8200   ING SUBSYSTEM.     VOLII      DESIGN SPECIFICATION REPORT =RELIABILITY CENTRAL AUTOMATIC DATA PROCESS
FILE-USNT03    FILE SYSTEM,      VOLUMEN   5,INFORMATION RETRIEVAL =INTELLIGENCE DATA PROCESSING SYSTEM,FORMATTED
ALER-KELL01   E SERIES (POUR     VOLUME)   =ALERT-1 REFERENC
NIPS-IBM508   S 360 FFS)-VOL.    V(A)       OUTPUT PROCESSOR (OP) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSIN
SPAN-SYST04   F SPAN CONTROL     WORDS     =SPAN REFERENCE MANUAL,GLOSSARY O
RFAS-WORR07                      WORKING   DOCUMENTATION FOR REMOTE FILE MANAGEMENT SYSTEM =
XD-1-CATA03   ANGUAGE OF THE     XD-1      (AN/FSQ-7) RETRIEVAL SYSTEM =QUERY L
AFIC-RI1102   UNIFILE SYSTEM     (A        DETAILED DESCRIPTION) =THE DUPLEX
AIDS-IBM605   CE DATA SYSTEM     (AIDS)    =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
AIDS-IBM103   CE DATA SYSTEM     (AIDS)    VOL.I =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
AIDS-IBM205   CE DATA SYSTEM     (AIDS)    VOLUME II.APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
AIDS-IBMA05   CE DATA SYSTEM     (AIDS)    VOLUME I.APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
AIDS-IBM305   CE DATA SYSTEM     (AIDS)    VOL.III,APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
AIDS-IBM405   CE DATA SYSTEM     (AIDS)    VOL.IV,APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
AIDS-IBM505   CE DATA SYSTEM     (AIDS)    VOL.V,APPENDIX =APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGEN
XD-1-CATA03   GE OF THE XD-1     (AN/FSQ-7) RETRIEVAL SYSTEM =QUERY LANGUA
GIS-IBMC1X               GIS     (BASIC)   APPLICATION DESCRIPTION MANUAL =
COLI-SPI202   QUERY LANGUAGE     (COLINGO) =USSTRICOM PHASE I
ICS-IBM407 -  LANGUAGE NO. 1     (QL-1)    ENCYCLOPEDIA =DATA
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DACE-BARN05   : RUBINOFF, M.      (ED          ). TOWARD A NATIONAL INFORMATION SYSTEM: 2ND ANNUAL NATL. COLLOQUIUM ON INF. R
NIPS-101308   CE PROPER DISK      (FMPD)       =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SYSTEM (NIPS)IBM 1410/7010,V
NIPS-101207   LE MAINTENANCE      (FM)         =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010 V
NIPS-101108   LE MAINTENANCE      (FM)         =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010
NIPS-104308   LE MAINTENANCE      (FM)         =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
  GEN-SENK05  ALUATION MODEL      (FOREM)       =A FILE ORGANIZATION EV
ALER-KELL01   FERENCE SERIES      (FOUR        VOLUME) =ALERT-1 RE
NIPS-104208   LE STRUCTURING      (FS)         =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
IDS-GENE00    TED DATA STORE      (GECOS       III) =GE 625/635 INTEGRA
AFIC-KI1102   UNIFILE SYSTEM      (GENERAL     DESIGN SPECIVICATION FOR IBM 7090 COMPONENT) =THE DUPLEX
ISAR-GRKJ05       PROCESSING      (ISAR        BASE) =GENERAL PURPOSE EXTERNAL MEMORY SYSTEM FOR DATA BASE
MIS-SEMP00    RMATION SYSTEM      (MIS)        =IBM SYSTEM/360 MANAGEMENT INFO
NIPS-104200   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.II: FILE STRUCTURING (FS) =NATIONAL MILITARY COMMAND SYSTEM INFOR
NIPS-104508   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.VIII: UTILITY SUPPORT (US) =NATIONAL MILITARY COMMAND SYSTEM INFO
NIPS-104708   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.VII: REMOTE DEVICE (RD) =NATIONAL MILITARY COMMAND SYSTEM INFORMA
NIPS-104908   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.IX(A): ERROR CODES (REVISED) =SYSTEM 360 FORMATT
NIPS-104A08   ED FILE SYSTEM      (NIPS        360 FFS)-GENERAL DESCRIPTION =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PRO
NIPS-104308   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.III: FILE MAINTENANCE (FM) =NATIONAL MILITARY COMMAND SYSTEM INFO
NIPS-104508   ED FILE SYSTEM    . (NIPS        360 FFS)-VOL.V(A): OUTPUT PROCESSOR (OP) =NATIONAL MILITARY COMMAND SYSTEM INF
NIPS-104408   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.IV: RETRIEVAL AND SORT PROCESSOR (RASP) =NATIONAL MILITARY COMMAN
NIPS-104108   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.I: INTRODUCTION TO FILE CONCEPT =NATIONAL MILITARY COMMAND SYSTEM
NIPS-104008   ED FILE SYSTEM      (NIPS        360 FFS)-VOL.VI: SYSTEM FORMATTED OUTPUT (SFO) =NATIONAL MILITARY COMMAND SYST
NIPS-104A05   ED FILE SYSTEM      (NIPS        360 FFS)-CAPABILITY DESIGN SPECIFICATION =NATIONAL MILITARY COMMAND SYSTEM INF
NIPS-104B08   ED FILE SYSTEM      (NIPS        360 FFS)-PROCEDURE LIBRARY OPERATORS MANUAL =NATIONAL MILITARY COMMAND SYSTEM
NIPS-10A008   CESSING SYSTEM      (NIPS)       IBM 1410/7010 USER'S MANUAL =NMCS INFORMATION PRO
NIPS-10A208   CESSING SYSTEM      (NIPS)       IBM 1410/7010 VOL.II. DATA RETRIEVAL AND OUTPUT =ANALYTICAL MANUAL NMCS INFORM
NIPS-101708   NG SYSTEM           (NIPS)       IBM 1410/7010.VOL.I. GENERAL PURPOSE COMPONENTS, PART VII,REMOTE INQUIRY (RIP)
NIPS-101507   NG SYSTEM           (NIPS)       IBM 1410/7010.VOL.I. GENERAL PURPOSE COMPONENTS PART V. OUTPUT =PROGRAM DESCRI
NIPS-10P308   NG SYSTEM           (NIPS)       IBM 1410/7010 VOL.III SYSTEM ALTERATIONS =PROGRAM DESCRIPTION:NMCS INFORMATION
NIPS-101207   NG SYSTEM           (NIPS)       IBM 1410/7010 VOL.I. GENERAL PURPOSE COMPONENTS PART II. FILE MAINTENANCE (FM)
NIPS-10A100   CESSING SYSTEM      (NIPS)       IBM 1410/7010 VOL.I. FILE,MAINTENANCE,STRUCTURING,AND REVISION =ANALYTICAL MAN
NIPS-104208   CESSING SYSTEM      (NIPS)       IBM 1410/7010 VOL.II.OPERATING INSTRUCTIONS =OPERATORS MANUAL NMCS INFORMATIO
NIPS-102208   ING SYSTEM          (NIPS)        IBM 1410/7010 VOL.II.GENERAL AND UTILITY SUPPORT COMPONENTS.PART II. UTILITY S
NIPS-102108   NG SYSTEM           (NIPS)       IBM 1410/7010.VOL.II.GENERAL PURPOSE COMPONENT. PART I. GENERAL SUPPORT =PROGR
NIPS-10A400   CESSING SYSTEM      (NIPS)       IBM 1410/7010 VOL.IV. ERROR PROCEDURES =ANALYTICAL MANUAL NMCS INFORMATION PRO
NIPS-10A308   CESSING SYSTEM      (NIPS)       IBM 1410/7010 VOL.III. GENERAL AND UTILITY FUNCTIONS =ANALYTICAL MANUAL NMCS I
NIPS-101108   ING SYSTEM          (NIPS)       IBM 1410/7010 VOL.I.GENERAL PURPOSE COMPONENTS. PART I. FILE MAINTENANCE (FM)
NIPS-100108   CESSING SYSTEM      (NIPS)        IBM 1410/7010 VOL.I. DECK SEQUENCES AND ERROR CODES =OPERATORS MANUAL NMCS IN
NIPS-101007   NG SYSTEM           (NIPS)       IBM 1410/7010.VOL.I.GENERAL PURPOSE COMPONENT. PART VI. OUTPUT =PROGRAM DESCRI
NIPS-101407   ING SYSTEM          (NIPS)       IBM 1410/7010 VOL.I GENERAL PURPOSE COMPONENTS. PART IV.RETRIEVAL AND SORT PRO
NIPS-102308   NG SYSTEM           (NIPS)IBM    1410/7010.VOL.II GENERAL AND UTILITY SUPPORT COMPONENTS,PART III. UTILITY SUPP
NIPS-101308   ING SYSTEM          (NIPS)IBM    1410/7010.VOL.I.GENERAL PURPOSE COMPONENTS. PART III.FILE MAINTENANCE PROPER D
NIPS-101008   NG SYSTEM           (NIPS)IBM    1410/7010.VOL.I. GENERAL PURPOSE COMPONENTS. =PROGRAM DESCRIPTION:NMCS INFORMA
NIPS-104007   CESSING SYSTEM      (NIP)        IBM 1410/7010 =NMCS INFORMATION PRO
NIPS-104508   IPUT PROCESSOR      (OP)         =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
  GEN-DUAR07   SYSTEMS: PEGS      (PARAMETRIC  EVALUATION OF GENERALIZED SYSTEMS)=A METHODOLOGY FOR COMPARISON OF GENERALIZED
IPS-10MR03    CTIONAL DESIGN      (PFD)        IPS PHASE II =PRELIMINARY FUN
PUG-APPL07           THE PUD      (PROGRAM     FOR DESCRIPTOR QUERY) INFORMATION RETRIEVAL SYSTEM =
NIPS-101407   SORT PROCESSOR      (RASP)       =PROGRAM DESCRIPTION: NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/7010
NIPS-104408   SORT PROCESSOR      (RASP)       =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
NIPS-104708    REMOTE DEVICE      (RD)         =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
SAC-JACK02     SYSTEM DESIGN      (REFERS      TO THE PHASE II SAC/AIDS SYSTEM) =COLLECTED DATA ON THE PROGRAM
NIPS-104908   :  ERROR CODES      (REVISED)    =SYSTEM 360 FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.IX(A)
NIPS-101708   .REMOTE INQUIRY     (RIP)(UPDATE)(STRIP) =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SYSTEM (NIPS) IBM 1410/701
NIPS-104008   RMATTED OUTPUT      (SFO)        =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
IMS-104400     SYSTEM/360         (SYSTEM      =NATIONAL MILITARY COMMAND SYSTEM INFORMATION MANAGEMENT SYSTEM/360
                                               DESCRIPTION) APPLICATION DESCRIPTION MANUAL =INFORMATION MANAGEMENT SYSTEM/360
TUFF-NAVA03    704/7090 TUFF      (TAPE        UPDATER FOR FORMATTED FILES),ON-LINE MESSAGES AND ERROR STOPS =
TDMS-SDCXX   MENT    SYSTEM    (TDMS)       =FILE ORGANIZATION IN THE SDC TIME-SHARED DATA MANAGE
TDMS-SDC1XX  AGEMENT SYSTEM    (TDMS)       - LANGUAGE SPECIFICATIONS =THE TIME-SHARED DATA MAN
TDMS-SLE107  AGEMENT SYSTEM    (TDMS)       =TREATING HIERARCHICAL DATA STRUCTURES IN THE SDC TIME-SHARED DATA MAN
NIPS-1B4308  TILITY SUPPORT    (US)         =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM 360 FORMATTED
IPS-USNA03   E SYSTEM   VOL.   1-PROGRAM    DES. VOL.2-PROGRM FLOW DIAGRAMS AND LISTINGS. VOL.4-INF.SYSTEM DESIGN AND UTIL
GIRP-DATA03  HE           IBM  1401         COMPUTER =A GENERALIZED INFORMATION RETRIEVAL PROGRAM FOR T
MADA-CRON05  EM FOR THE IBM    1401         =MADAM:A USER-ORIENTED INFORMATION PROCESSING SYST
FFS-DEFE00               TDMS  1410         FORMATTED FILE SYSTEM:OPERATOR'S MANUAL =
FFS-DEFF00               TDMS  1410         FORMATTED FILE SYSTEM:FILE MAINTENANCE AND FILE GENERATION MANUAL =
FFS-DEF000               TDMS  1410         FORMATTED FILE SYSTEM - RETRIEVAL AND OUTPUT MANUAL =
NIPS-1BA008  TEM (NIPS) IBM    1410/7010     USER'S MANUAL =NMCS INFORMATION PROCESSING SYS
NIPS-1B1308        (NIPS)IBM   1410/7010    VOL.I.GENERAL PURPOSE COMPONENTS. PART III.FILE MAINTENANCE PROPER DISK (FMPD)
NIPS-1B1808        (NIPS)IBM   1410/7010    VOL.I. GENERAL PURPOSE COMPONENTS. =PROGRAM DESCRIPTION:NMCS INFORMATION PROCE
NIPS-1B2308        (NIPS)IBM   1410/7010    VOL.II GENERAL AND UTILITY SUPPORT COMPONENTS.PART III. UTILITY SUPPORT =PROGR
NIPS-1BP308       (NIPS) IBM   1410/7010    VOL.III SYSTEM ALTERATIONS =PROGRAM DESCRIPTION:NMCS INFORMATION PROCESSING SY
NIPS-1B4208  EM (NIPS)  IBM    1410/7010    VOL.II.OPERATING INSTRUCTIONS =OPERATORS MANUAL NMCS INFORMATION PROCESSING SY
NIPS-1B1207       (NIPS) IBM   1410/7010    VOL.I. GENERAL PURPOSE COMPONENTS PART II. FILE MAINTENANCE (FM) =PROGRAM DESC
NIPS-1BA108  TEM (NIPS) IBM    1410/7010    VOL.I. FILE,MAINTENANCE,STRUCTURING,AND REVISION =ANALYTICAL MANUAL NMCS INFOR
NIPS-1BA208  TEM (NIPS) IBM    1410/7010    VOL.II. DATA RETRIEVAL AND OUTPUT =ANALYTICAL MANUAL NMCS INFORMATION PROCESSI
NIPS-1B2108       (NIPS) IBM   1410/7010    VOL.II.GENERAL PURPOSE COMPONENT. PART I. GENERAL SUPPORT =PROGRAM DESCRIPTION
NIPS-1BA007  STEM (NIP) IBM    1410/7010    =NMCS INFORMATION PROCESSING SY
NIPS-1B1108       (NIPS) IBM   1410/7010    VOL.I.GENERAL PURPOSE COMPONENTS. PART I. FILE MAINTENANCE (FM) =PROGRAM DESCR
NIPS-1B1507       (NIPS) IBM   1410/7010    VOL.I. GENERAL PURPOSE COMPONENTS PART V. OUTPUT =PROGRAM DESCRIPTION:NMCS INF
NIPS-1B1407       (NIPS) IBM   1410/7010    VOL.I GENERAL PURPOSE COMPONENTS. PART IV.RETRIEVAL AND SORT PROCESSOR (RASP)
NIPS-1BA408  TEM (NIPS) IBM    1410/7010    VOL.IV. ERROR PROCEDURES =ANALYTICAL MANUAL NMCS INFORMATION PROCESSING SYS
NIPS-1BA308  TEM (NIPS) IBM    1410/7010    VOL.III. GENERAL AND UTILITY FUNCTIONS =ANALYTICAL MANUAL NMCS INFORMATION PRO
NIPS-1B1007       (NIPS) IBM   1410/7010    VOL.I.GENERAL PURPOSE COMPONENT. PART VI. OUTPUT =PROGRAM DESCRIPTION:NMCS INF
NIPS-1B1708       (NIPS) IBM   1410/7010    VOL.I. GENERAL PURPOSE COMPONENTS. PART VII.REMOTE INQUIRY (RIP)(UPDATE)(STRIP
NIPS-1B0108  EM (NIPS)  IBM    1410/7010    VOL.I. DECK SEQUENCES AND ERROR CODES =OPERATORS MANUAL NMCS INFORMATION PROCE
NIPS-1B2208       (NIPS) IBM   1410/7010    VOL.II.GENERAL AND UTILITY SUPPORT COMPONENTS.PART II. UTILITY SUPPORT =PROGRA
DACE-DAR105           SYSTEM:  2ND          ANNUAL NATL. COLLOQUIUM ON INF. RETRIEVAL =RELIABILITY CENTRAL DATA MANAGEMENT
 GEN-SDC?05              THE   2ND          SYMPOSIUM ON COMPUTER-CENTERED DATA BASE SYSTEMS =
IPS-USNA03   OGRAM DES. VOL.   2-PROGRM     FLOW DIAGRAMS AND LISTINGS. VOL.4-INF.SYSTEM DESIGN AND UTILIZATION. VOL.5-INF
IDS-GEN?07                DE   200          SERIES INTEGRATED DATA STORE =
INFO-CON105                    3400         3000 COMPUTER SYSTEMS INFOL GENERAL INFORMATION MANUAL=
NIPS-1BM508  E SYSTEM (NIPS    360          FFS)-VOL.V(A): OUTPUT PROCESSOR (OP) =NATIONAL MILITARY COMMAND SYSTEM INFORMA
NIPS-1BM908  E SYSTEM (NIPS    360          FFS)-VOL.IX(A): ERROR CODES (REVISED) =SYSTEM 360 FORMATTED FIL
NIPS-1BM408  E SYSTEM (NIPS    360          FFS)-VOL.IV: RETRIEVAL AND SORT PROCESSOR (RASP) =NATIONAL MILITARY COMMAND SY
NIPS-1BM008  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.VI: SYSTEM FORMATTED OUTPUT (SFO) =NA
NIPS-1BM808  E SYSTEM (NIPS    360          FFS)-VOL.VIII: UTILITY SUPPORT (US) =NATIONAL MILITARY COMMAND SYSTEM INFORMAT
NIPS-1BM708  E SYSTEM (NIPS    360          FFS)-VOL.VII: REMOTE DEVICE (RD) =NATIONAL MILITARY COMMAND SYSTEM INFORMATION
NIPS-1BM700  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.VII: REMOTE DEVICE (RD) =NATIONAL MIL
NIPS-1BM308  E SYSTEM (NIPS    360          FFS)-VOL.III: FILE MAINTENANCE (FM) =NATIONAL MILITARY COMMAND SYSTEM INFORMAT
NIPS-1BM005  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.VIII: UTILITY SUPPORT (US) =NATIONAL
NIPS-1BM?0?  E SYSTEM (NIPS    360          FFS)-CAPABILITY DESIGN SPECIFICATION =NATIONAL MILITARY COMMAND SYSTEM INFORMA
NIPS-1BM108  E SYSTEM (NIPS    360          FFS)-VOL.I: INTRODUCTION TO FILE CONCEPT =NATIONAL MILITARY COMMAND SYSTEM INF
NIPS-1BM105  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.I: INTRODUCTION TO FILE CONCEPT =NATI
NIPS-1BM000  E SYSTEM (NIPS    360          FFS)-PROCEDURE LIBRARY OPERATORS MANUAL =NATIONAL MILITARY COMMAND SYSTEM INFO
NIPS-1BM900           SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.IX(A): ERROR CODES (REVISED) =
NIPS-1BM308  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.III: FILE MAINTENANCE (FM) =NATIONAL
NIPS-1BM?08  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-GENERAL DESCRIPTION =NATIONAL MILITARY CO
NIPS-1BM208  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.II: FILE STRUCTURING (FS) =NATIONAL M
NIPS-1BM508  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.V(A): OUTPUT PROCESSOR (OP) =NATIONAL
NIPS-1BM308  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-PROCEDURE LIBRARY OPERATORS MANUAL =NATIO
NIPS-1BM408  ING      SYSTEM   360          FORMATTED FILE SYSTEM (NIPS 360 FFS)-VOL.IV: RETRIEVAL AND SORT PROCESSOR (RAS
NIPS-1BM008  E SYSTEM (NIPS    360          FFS)-VOL.VI: SYSTEM FORMATTED OUTPUT (SFO) =NATIONAL MILITARY COMMAND SYSTEM I
NIPS-1BM208  E SYSTEM (NIPS    360          FFS)-VOL.II: FILE STRUCTURING (FS) =NATIONAL MILITARY COMMAND SYSTEM INFORMATI
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NIPS-IBMA68   ING      SYSTEM     360            FORMATTED FILE SYSTEM (NIPS 360 FFS)-CAPABILITY DESIGN SPECIFICATION =NATIONAL
NIPS-IBMM68   E SYSTEM (NIPS      360            FFS)-GENERAL DESCRIPTION =NATIONAL MILITARY COMMAND SYSTEM INFORMATION PROCESS
INFO-CONT66                       3800           3800 COMPUTER SYSTEMS INFOL REFERENCE MANUAL =
INFO-CONT65             3400,     3600           COMPUTER SYSTEMS INFOL GENERAL INFORMATION MANUAL=
INFO-CONT66             3600,     3800           COMPUTER SYSTEMS INFOL REFERENCE MANUAL =
IPS-USNA63     LISTINGS. VOL.     4-INF          SYSTEM DESIGN AND UTILIZATION. VOL.5-INF.RET.=INTELLIGENCE DATA PROCESSING SYS
IDS-GENR67                  GE    400            SERIES IDS/COBOL =
473L-IBMC63   C OPTIMIZATION      473L           IOC PHASE =TECHNICAL MEMO FOR IO
IPS-USNA63    ILIZATION. VOL.     5-INF          RET.=INTELLIGENCE DATA PROCESSING SYSTEM FORMATTED FILE SYSTEM VOL.1-PROGRAM D
IDS-GENE66                  GE    625/635        INTEGRATED DATA STORE (GECOS III) =
TUFF-NAVA63                       704/7090       TUFF (TAPE UPDATER FOR FORMATTED FILES),ON-LINE MESSAGES AND ERROR STOPS =
TUFF-WILR63   R'S MANUAL FOR      704/7090       TUFF MOD III,TAPE UPDATER FOR FORMATTED FILES =USE
IPS-GERA63    TRIEVAL SYSTEM      704/7090       -.USER'S MANUAL =INFORMATION RE
IPS-GERAXX    MANUAL FOR THE      704/7090       INFORMATION RETRIEVAL =USER'S
SAC-IBMC62    AC PROCEDURES:      7090/1401      OPERATION =AID/S
COLI-MITR64            COLINGO    'D'            A CONTROL LANGUAGE FOR US STRIKE COMMAND =
COLI-ROBE64   TRICOM COLINGO      'D'            SYSTEM DESCRIPTION =USS
IPS-NAVC68    OLUME 3,PART 2:     'FILE          MAINTENANCE SUBSYSTEM,INFORMATION RETRIEVAL SUBSYSTEM,LIBRARY MAINTENANCE SUBS
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$FIN                                                        00


   RUNID:  7005     ACCOUNT: 001-11-722     PROJECT: FONG

      LOAD 2711   3/3 SORT        -1 7005

      LOAD 2023   3/4 FILEY       -1 7005

      SERVICE     3/3

END OF SORT: TIME PER RECORD = 38.8 MSEC.

INPUT RECORD COUNT IS  :    1955
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      SERVICE     3/4
END OF SORT: TIME PER RECORD = 39.3 MSEC.
INPUT RECORD COUNT IS  :    1955
OUTPUT RECORD COUNT IS :    1955
BIAS IS    1.4
END OF SORT: TIME PER RECORD =101.9 MSEC.
INPUT RECORD COUNT IS  :     404
OUTPUT RECORD COUNT IS :     404
BIAS IS     .7
    TIME: 00:00:16.788    IN: 1477   OUT: 0       PAGES:   61
    INITIATION  TIME:   07:32:31-DEC 20,1969
    TERMINATION TIME:   07:53:56-DEC 20,1969
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